Spicer® TPCS
(Tire Pressure Control System)

SPICER®

DANA

Troubleshooting Guide

Older Systems (ECU's w/Dual Connectors, p/n 673782 & 673277)

AXTS0010

October 2007

General Information

The description and specifications contained in this service publication are current at the time of printing.

Spicer® reserves the right to discontinue or modify its models and/or procedures and to change specifications at any time without notice.

Any reference to brand name in this publication is made as an example of the types of tools and materials recommended for use and should not be considered an endorsement. Equivalents may be used.

IMPORTANT NOTICE

This symbol is used throughout this manual to call attention to procedures where carelessness or failure to follow specific instructions may result in personal injury and/or component damage.

Departure from the instructions, choice of tools, materials and recommended parts mentioned in this publication may jeopardize the personal safety of the service technician or vehicle operator.

WARNINGS: Failure to follow indicated procedures creates a high risk of personal injury to the servicing technician.

CAUTION: Failure to follow indicated procedures may cause component damage or malfunction.

NOTE: Additional service information not covered in the service procedures.

Tip: Helpful removal and installation procedures to aid in the service of this unit.

Always use genuine Spicer replacement parts.

Every effort has been made to ensure the accuracy of all information in this guide. **However, Spicer Axle and Brake Division makes no expressed or implied warranty or representation based on the enclosed information.**

Any errors or omissions may be reported to:
Dana Commercial Vehicle Products Group I 3939 Technology Drive I Maumee, Ohio, USA 43537

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Introduction

Tire Pressure Control System

Spicer's Tire Pressure Control System features dashboard control of tire air pressure through:

- Simple push button operation.
- Independent Steer, Drive, and Trailer operation.
- Electronic braking priority for air system.
- Vehicle speed sensing and response capability.
- Self-diagnostics.

Purpose and Scope of Manual

This manual explains how to diagnose problems or failures of the Spicer Tire Pressure Control System. While this manual also includes a basic summary of system components and control operation, it does not provide all information necessary to fully support an installed Tire Pressure Control System. For information on service, installation and full system operation, request appropriate documents from your Spicer representative.

- Service Manual
- Installation Guide
- Operator's Guide

Organization of Manual

The following is an overview:

Section 1: Introduction. Describes the purpose, scope, and organization of this manual as well as introduces the Tire Pressure Control System.

Section 2: Operation. Reviews the components that make up the Tire Pressure Control System as well as gives a simplified scenario of how the system functions.

Section 3: Operator Instructions. Describes how to operate the system with the Operator Control Panel.

Section 4: General Service Guidelines. Covers the requirements of the air dryer, line replacement and wheel valve filter maintenance.

Section 5: Diagnostics. Covers the procedures and tools for running diagnostics on the Tire Pressure Control System.

Section 6: Troubleshooting. Covers the procedures for finding and isolating causes, in addition to reference pages, fault codes and cross-references to the Tire Pressure Control System Service Manual.

Appendix A: Tire Pressure Control System Wiring Diagram. Includes component connectors and electrical schematic.

Operation

Component Description

The following describes how each component of the Tire Pressure Control System functions. Figure 1 shows the approximate location of each component.

Wheel Valve

All axles under tire pressure control incorporate a wheel valve at each wheel end. Dual wheels are typically connected to one wheel valve at the outer wheel to provide tire pressure balance. When the system is idle, the wheel valve isolates the tire(s) from the system, thereby extending seal life since the seals are not under constant pressure. The valve also ensures fail safe operation should the system become disabled or inoperable. The wheel valve provides for inflation of the tires from the vehicle air supply via the pneumatic controller, and deflation of the tires upon system 1emand.

Electronic Control Unit (ECU)

The Electronic Control Unit is the control center for the entire Tire Pressure Control System. The Electronic Control Unit receives commands from the driver through the Operator Control Panel and transmits appropriate signals throughout the system. The Electronic Control Unit is typically mounted in the cab behind the passenger seat near the Pneumatic Control Unit.

Operator Control Panel (OCP)

By using the Operator Control Panel keys, the operator selects tire pressures for the conditions encountered. The panel also displays such system parameters as current tire pressures, selected modes, and system status. The Operator Control Panel is typically mounted on the dash within view and reach of the driver.

Pneumatic Control Unit (PCU)

The Pneumatic Control Unit is a solenoid controlled manifold that receives commands from the Electronic Control Unit and controls the air system. It also contains the pressure transducer which transmits the pressure readings to the Electronic Control Unit. The Pneumatic Control Unit delivers the proper control signal to the appropriate channel (steer/drive/trailer).

Speed Sensor

The speed sensor provides the Electronic Control Unit with vehicle speed information. If the vehicle speed is above programmed limits, the system will display an overspeed indication on the Operator Control Panel. Continued operation in this condition will cause the system to automatically inflate the tires to a more appropriate pressure.

Pressure Switch

The pressure switch acts as an electronic brake priority switch. It prevents the Tire Pressure Control System from consuming air from the wet tank until the brake system is fully charged. This prevents the Tire Pres sure Control System from allowing the primary and secondary tanks to go below recommended operating pressures for braking.

Operation

Air Lines

The Tire Pressure Control System uses a dedicated pneumatic system plumbed from the vehicle's existing wet tank.

Wiring

All electric cables and connectors are supplied in an integrated harness.

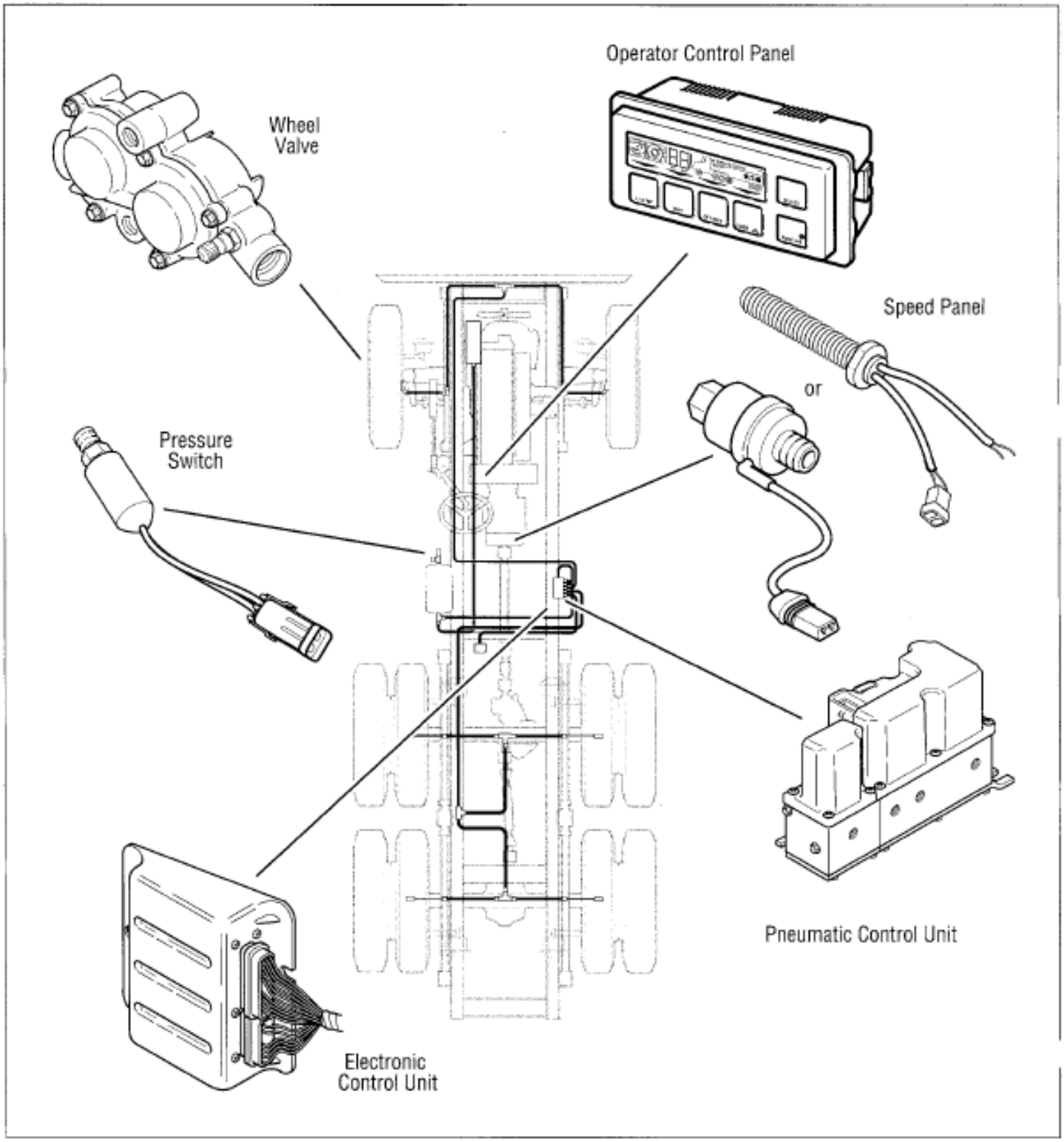


Figure 1 Tire Pressure Control System Components

Operation

System Operation

A vehicle equipped with the Tire Pressure Control System will seem to operate the same as a vehicle without the Tire Pressure Control System, however, there are some differences:

- During standard operation the Electronic Control Unit will check tire pressures every 5 to 15 minutes to make sure that pressures are maintained at selected settings.
- Immediately after a pressure increase, the pressure is rechecked after approximately 30 seconds.
- During the run flat mode tire pressures are checked more often.

During all of the above checks, solenoid clicking and air exhausting from the Pressure Control Unit may be heard.

The following is a description of how the Tire Pressure Control System functions. Figure 2 shows a simplified schematic of how the components of the system relate to one another.

Pressure Regulation

The Tire Pressure Control System regulates tire pressures through a series of electro-pneumatic controls that supply air to each wheel end through wheel valves. The driver operates a dash-mounted graphic control panel (the Operator Control Panel) which commands the system to adjust tire pressure.

Pressure Mode

The driver selects a desired tire pressure mode by pressing buttons on the Operator Control Panel. The system responds by adjusting tire pressures to match the road surface and load. Indicators on the Operator Control Panel inform the driver of functions currently being performed.

Operator Control Panel

The Operator Control Panel also contains a built-in indicator to warn drivers when they are traveling too fast for selected tire pressures. If the vehicle's speed is not reduced the Tire Pressure Control System will automatically select the appropriate pressure. Addition ally, a warning icon will inform the driver to stop and check the tires if the system senses conditions that may indicate tire damage.

Air Seal life

When the Tire Pressure Control System is idle, not inflating, deflating or checking pressure, all tire air pressures are isolated from the Tire Pressure Control System. Tire pressure isolation extends seal life because the seals are not under continuous pressure. Isolation also provides fail-safe operation of the vehicle if the Tire Pressure Control System is disabled.

Operation

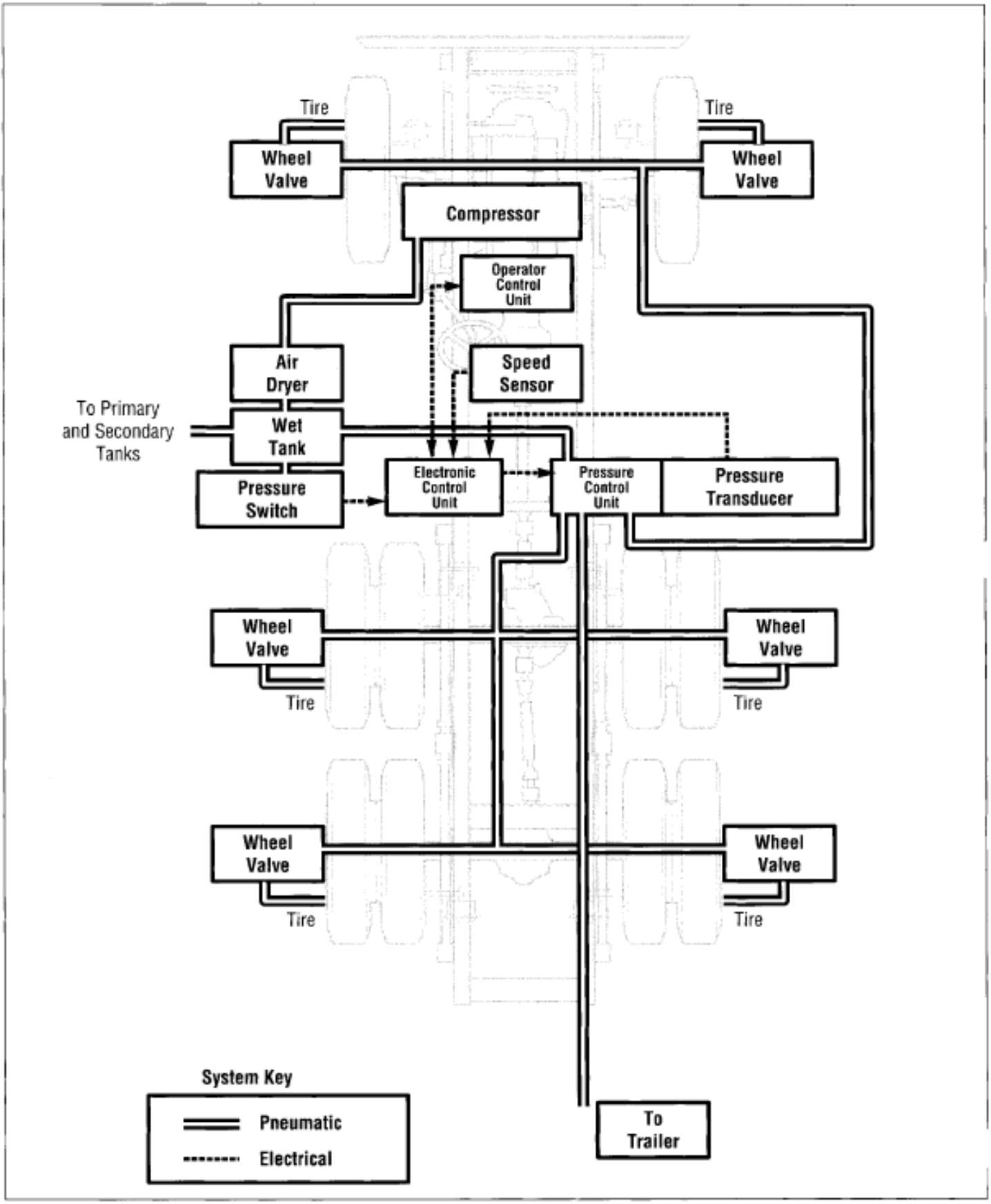


Figure 2 Simplified System Schematic

Operator Instructions

Operator Controls

The dash-mounted Operator Control Panel is the sole interface for display of operator information and for key entry of system instructions. Figure 3 shows the Operator Control Panel. The following sections explain the purpose and operation of all Operator Control Panel features.

Warning Icons

The two warning icons report operating problems. You must take immediate action to either reduce vehicle speed or check tire condition.

Reduce Vehicle Speed - This signal reports that the vehicle speed is too fast for the pressure selected. You must either reduce speed or select a higher pressure by pressing the appropriate key. Continued operation in this mode will result in the system automatically selecting a more appropriate pressure setting.

Check Tire Condition -This signal reports that one tire is at a significantly lower pressure than the others and could indicate that a tire is not holding pressure. The operator should immediately stop the vehicle and identify the extent of tire damage. The system may be used to re-inflate the low tire if damage is deter mined to be minimal (e.g., a minor puncture or slow leak) by selecting "RUN FLAT." **The system should not be used to inflate tires with more substantial damage such as large cuts, chunk outs, or structural defects.**

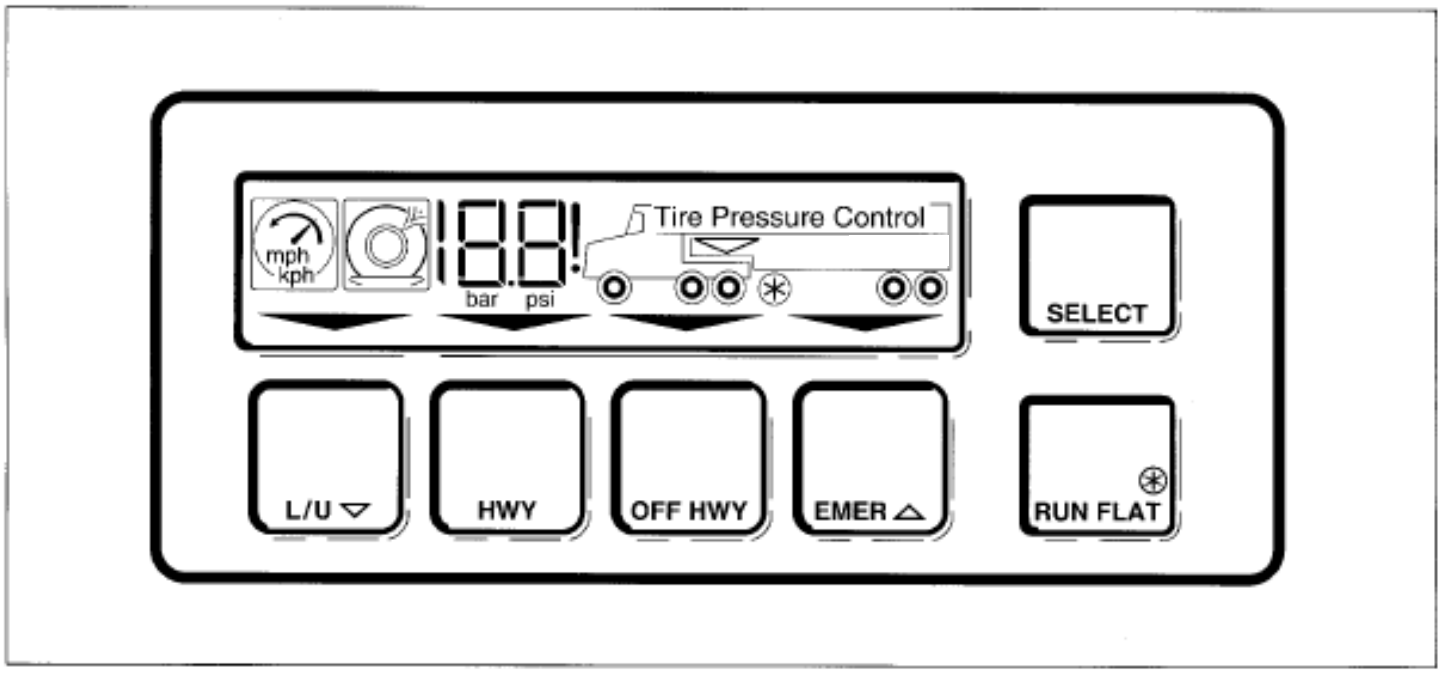
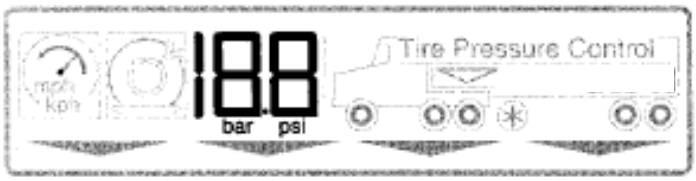


Figure 3 Operator Control Panel

Operator Instructions



Digital Display

The display shows either tire pressure or fault codes for the channel indicated by the illuminated inner tire rings (see Channel Indicators). When the system is actively changing tire pressure on the selected channel, a “bubble” display in clockwise rotation indicates inflation and counterclockwise indicates deflation.

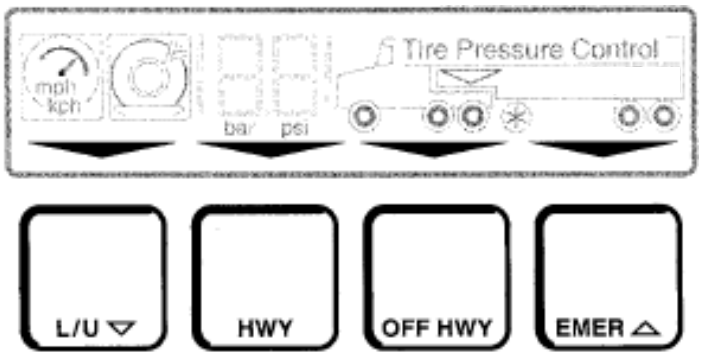
Fault Indication - The exclamation point indicates that the value shown in the digital display is not a pressure but rather a fault code. See Fault Codes Section.

Metric/English Indicator - This unit of measure indicator tells if the tire pressure is shown in metric (bar) or English (psi) units.

Mode Keys and Annunciator Arrows

These keys select pressures appropriate for different surface and loading conditions. The annunciator arrow points to the selected key and signals one of two states:

- If the arrow is flashing -the system is in the process of checking or changing pressures.
- If the arrow is lighted steady- the selected pressure has been achieved and the system is de-pressurized.



L/U Key (Loaded/Unloaded) - This key selects pressures appropriate for either a loaded or unloaded vehicle.

HWY - For high speed travel on paved surfaces.

OFF HWY - For operation on secondary roads.

EMER - For selection of extremely low tire pressures to help free a stuck vehicle.

IMPORTANT: The EMER key is for extreme conditions only and should not be used for normal driving.

Operator Instructions

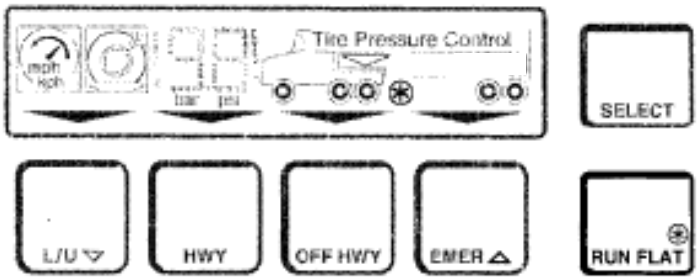
Loaded Indicator

The small arrow pointing to the drive wheels indicates whether you have selected loaded or unloaded pressures. You must select loaded if your vehicle is carry ing any load.

Caution: Operating a loaded vehicle at unloaded tire pressures may result in tire overheating and reduced tire life or blowout.

Run Flat Indicator

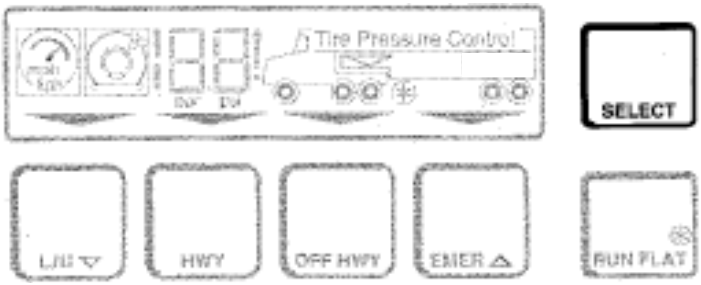
This asterisk matches the symbol on the “Run Flat” key and it indicates that the Run Flat feature is selected.



Run Flat Key

This key allows the operator to over-ride the 11P! (tire leak imbalance) fault. (See Check Tire Condition under Operator Controls in Section 3.) This key also instructs the system to check tire pressures at more frequent intervals. The “RUN FLAT” feature will automatically de-select after 10 minutes.

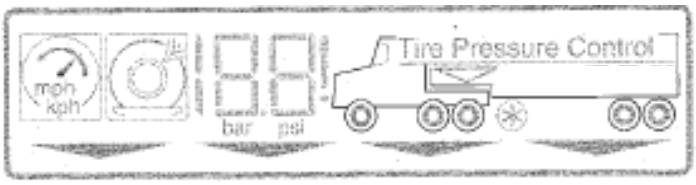
Operator Instructions



Select Key

This key allows the operator to continuously monitor one channel, or scan all of them. On power-up, the Operator Control Panel will not display any pressures (“Quiet Mode”). Pressing the select key once will cause the display to scan the tire pressures (see Channel Indicators). Repeated pressing will lock the display on each individual channel (so that any channel may be monitored continuously) and then return to the no display condition.

Note: All symbols on the display will light momentarily upon start of the vehicle.

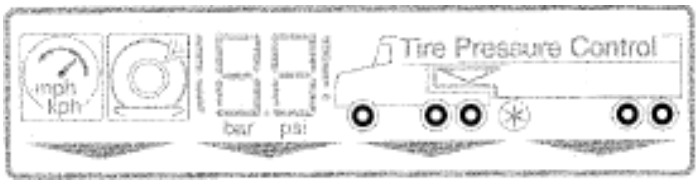


Configuration Indicators

The tractor / trailer outline show(s) whether the vehicle is configured with a two channel (tractor or straight truck) or three channel (tractor and trailer) Tire Pressure Control System.

Logomark

Indicates power on at vehicle start-up.



Channel Indicators

The rings inside the tires of the configuration indicators show with channel (steers, drives or trailers) is being reported by the digital display.

Operator Instructions

Tire Pressure Control System Programming

Spicer's Tire Pressure Control System features on location programming through the Operator Control Panel. Programmable settings include:

- Individual pressure settings for the steer, drive and trailer axles.
- Loaded and unloaded axle programming for highway, off highway and emergency conditions.
- Overspeed warning for highway, off highway or emergency conditions.

Enter the Tire Pressure Control System programming sequence by pressing the SELECT and L/U buttons at the same time. A flashing bar or psi verifies that you are in the programming mode and also indicates that the first selection, English or Metric values, is ready for programming. Refer to figure 4 for sample procedure.

Press up/down arrows to select options or change settings (pressure or speed) and press SELECT button to record a selection in memory and move to the next step.

Press the SELECT button repeatedly to move through the program steps, one step for each time the SELECT button is pressed. Refer to the programming reference chart for specific Tire Pressure Control System pres sure and speed programming steps.

To complete the programming sequence, or exit the programming mode, continue to press SELECT button to step through to the end of the procedure.

Note: If no buttons are pressed for more than one minute, the Operator Control Panel will end the programming sequence, saving any changes made during programming.

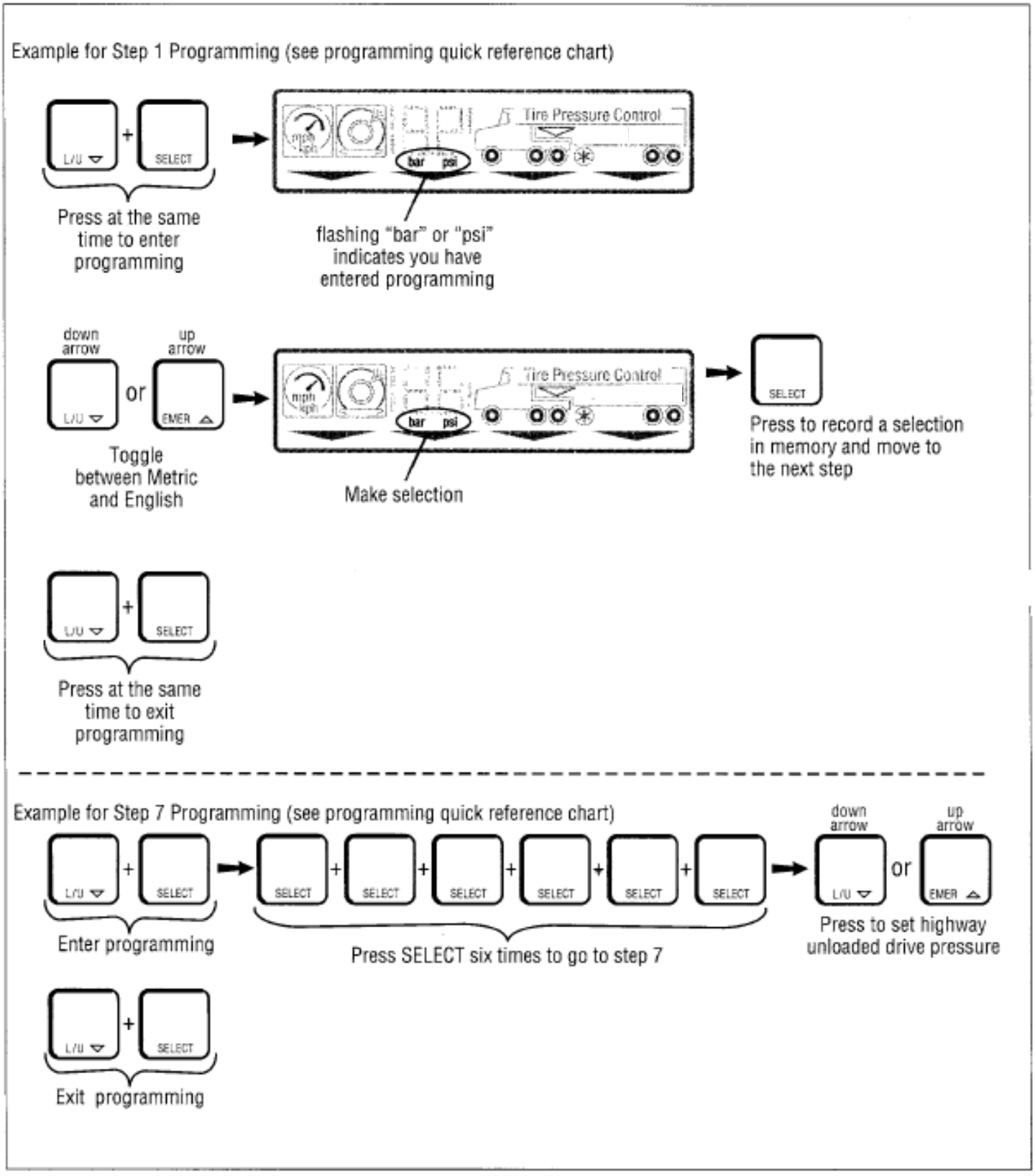

Example for Step 1 Programming (see programming quick reference chart)
L/U
SELECT
Press at the same time to enter programming
Tire Pressure Control
bar psi
flashing "bar" or "psi" indicates you have entered programming
down arrow
up arrow
or
Toggle between Metric and English
Make selection
Press to record a selection in memory and move to the next step
Press at the same time to exit programming
Example for Step 7 Programming (see programming quick reference chart)
Enter programming
Press SELECT six times to go to step 7
Press to set highway unloaded drive pressure
Exit programming

Figure 4 Entering the Programming Sequence

Programming Quick Reference Chart

Step	Setting	Metric English Indicator	Speed Indicator	Annunciator Arrows			Loaded Arrow	Channel Indicator		
				Hwy	Off Hwy	Emer		Steer	Drive	Trailer
1	Metric/English	On								
2	Highway Overspeed		On	On						
3	Highway Loaded Steer Pressure			On			On	On		
4	Highway Loaded Drive Pressure			On			On		On	
5	Highway Loaded Trailer Pressure			On			On			On
6	Highway Unloaded Steer Pressure			On				On		
7	Highway Unloaded Drive Pressure			On					On	
8	Highway Unloaded Trailer Pressure			On						On
9	Off-Highway Overspeed		On		On		On	On		
10	Off-Highway Loaded Steer Pressure				On		On		On	
11	Off-Highway Loaded Drive Pressure				On		On			On
12	Off-Highway Loaded Trailer Pressure				On			On		
13	Off-Highway Unloaded Steer Pressure				On				On	
14	Off-Highway Unloaded Drive Pressure				On					On
15	Off-Highway Unloaded Trailer Pressure				On					
16	Emergency Overspeed		On			On				
17	Emergency Loaded Steer Pressure					On	On	On		
18	Emergency Loaded Drive Pressure					On	On		On	
19	Emergency Loaded Trailer Pressure					On	On			On
20	Emergency Unloaded Steer Pressure					On		On		
21	Emergency Unloaded Drive Pressure					On			On	
22	Emergency Unloaded Trailer Pressure					On				On

General Service Guidelines

Service Guidelines

The Tire Pressure Control System requires normal maintenance much the same as other systems on the vehicle. Following are some general rules that apply to Tire Pres sure Control System service:

Clean and Dry Air Supply

The Spicer Tire Pressure Control System requires a constant supply of clean dry air. An adequately sized and properly maintained air dryer is critical for continued proper operation of the Tire Pressure Control System. Even though the air dryer may be working properly, moisture can accumulate in the wet tank during normal operation due to the increase in air consumption. It is important to drain the wet tank daily. Draining the wet tank completely when the truck is not in use will also help keep moisture under control.

Line Replacement and Routing

When replacing air lines, do not allow kinks, sharp bends or stretching in order to tighten joints. If any tube or hose segment does not appear to fit easily, it could mean you are not using the proper part or that you are not following service procedures properly. Ensure that replacement lines are the correct length.

Each segment of the pneumatic system must be secured to the vehicle frame or other installed line. After completing assembly of each segment, use cable ties to anchor the segment at approximately 18" intervals.

> **Caution:** Proper Tire Pressure Control System operation requires correct air line diameters and lengths for each channel. Refer to the Tire Pressure Control System service manual for length and diameter information.

Joint Compound

Here are some important "DO's" and "DON'Ts" regarding the use of thread sealant:

- **Do** apply a thin coating of compound on male threads of pipe joints, tubing connections, and other system fittings.
- **Don't** use any compound on 0-ring, compression, or flare fitting connections. Instead, apply a thin coat of silicone grease to 0-rings and flares.
- **Don't** use Teflon thread tape anywhere in the air system. (Teflon tape shreds can become lodged in valving.)

General Service Guidelines

Air Filter Change

Figure 5 shows the location of the air filter in each wheel valve. **This filter must be replaced whenever the tire or wheel valve is serviced.** Use the illustration as a reference in completing the air filter replacement as follows:

Caution: Do not Crush the air filter when installing the JIC flare.

1. Working quickly to prevent air loss, remove the tire hose assembly from the fitting on the outlet port of the wheel valve. Cap hose to prevent air loss.
2. Remove JIC flare from 9/16"-18 straight thread 0-ring fitting.
3. Use a screwdriver to dislodge the air filter from the wheel valve. Discard the used air filter.

Note: Air filters cannot be cleaned or reused, always replace with a new air filter.

4. Install new air filter into wheel valve outlet port.
5. Install JIC flare to wheel valve outlet port and torque to 16-19 lb.ft.
6. Install tire braided hose assembly to wheel valve outlet port and torque to 16-19 lb. ft.

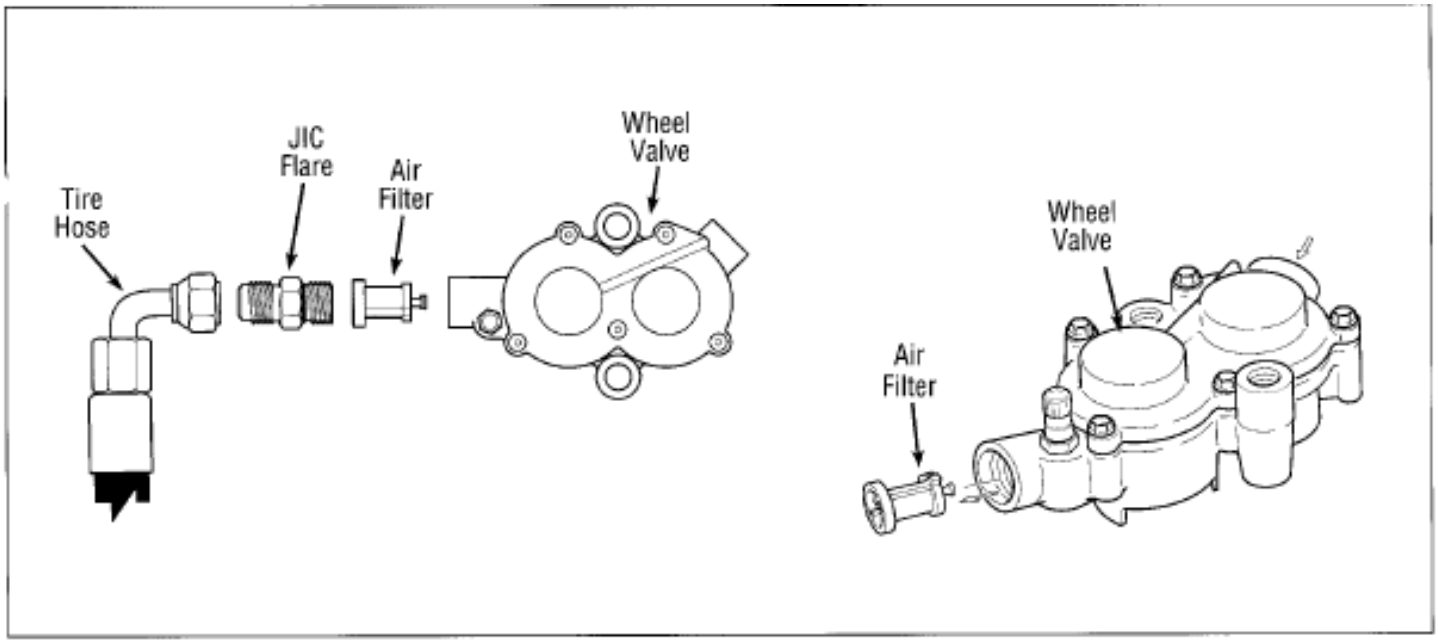


Figure 5 Air Filter Change

Diagnostics

This section covers the equipment and procedures used to find and correct Tire Pressure Control System problems.

Test Equipment

Tire Pressure Control System troubleshooting can be performed at three levels:

- Operator Control Panel codes
- Hand-held tester
- Personal computer-based diagnostics

Regardless of the testing equipment used, the troubleshooting procedures will be based upon the diagnostic fault codes. The hand-held tester and the personal computer system offer the advantages of computer-aided testing without interpreting fault codes.

Tire Pressure Control System Diagnostics

The onboard system diagnostics are an important feature of Spicer's Tire Pressure Control System. This section describes the use of fault odes to identify Tire Pressure Control System operating problems.

Tire Pressure Control System uses an alpha-numeric code, displayed at the Operator Control Panel, to identify the type (P=Pneumatic or C=Component) and area of fault (number). An example code is 1C!, where 1=power supply and C=component. Refer to the fault code chart (page 21) for more detailed information on fault codes.

Historical Fault Codes

Any time a fault occurs in the system an active fault code will be displayed by the Operator Control Panel. Only the most recent code is displayed by the Operator Control Panel. Historical codes are stored in memory. Historical codes can only be accessed by a hand held tester or personal computer. Historical codes are automatically cleared after 50-100 starts with no active faults.

Fault Codes

The Fault Codes are described in Section 6. Some fault codes also identify the component that is associated with the problem. A list of possible solutions are given in order of most likely occurrence.

Diagnostics

Hand-Held Testers

An OTC or MPSI hand-held tester may be used to read and clear fault codes and to obtain a short description of failures. The tester can initiate test sequences for controller outputs and can also read system parameters.

Personal Computer-Based Diagnostics

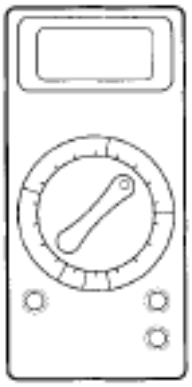
Personal computer based software provides the capability of hand-held testers with enhanced display and data .ogging capability. A personal computer can display multiple parameters and provide more comprehensive descriptions of fault conditions.

Use of a personal computer requires a serial link assembly such as Kent-Moore's part number J38351 and Spicer's Tire Pressure Control System diagnostic software.

Multimeter

Based upon system schematics and aided by component specific fault codes, a multimeter can be used to check sensor and solenoid resistances and to find wiring harness faults. The multimeter can be used to check the Tire Pressure Control System wiring and component for:

- continuity
- ground
- broken wires
- open circuits
- shorted circuits
- incorrect battery voltage



Troubleshooting

Troubleshooting Tips

This checklist outlines some general hints and guide lines that will be helpful in tracking down and correcting operating problems.

- **Operator Control Panel only displays one active code.**
  Only the most recent fault displays on the Operator Control Panel. In troubleshooting, be alert for related faults. Use of a Diagnostic tool offers the advantage of spotting multiple active faults as well as retrieving historical faults.

- **A cleared code alone does not indicate a corrected problem.**
  A code is set by a specific fault condition and can be cleared by switching on the ignition. It's possible to clear a code (i.e., remove it from the Operator Control Panel display) only to have it display again when the fault condition re-occurs. To insure that a problem is fixed, you must run the system through the same operating modes that caused the problem and verify that the fault code does not appear.

- **Disconnect both Electronic Control Unit connectors with ignition off.**
  To avoid setting electrical fault codes, make sure that the ignition is off before unplugging the wire harness connections at the Electronic Control Unit module. Also, always disconnect both the 30 way and the 18 way connectors, never just one. Reconnect both connectors before switching on the ignition.

- **C Code faults are often connection problems.**
  The most likely cause of component faults will be damaged wires or connections. As a first step in troubleshooting all C codes, switch off vehicle ignition, then disconnect applicable connectors and inspect for damage. (Switch ing off the ignition is required before disconnecting the harness at the Electronic Control Unit, but is also a recommended practice before all other electrical system disconnections.) Clean or repair all bad connections before proceeding.

- **System is not continually pressurized.**
  When troubleshooting P Code faults, keep in mind that the air system is only pressurized as needed (for example, in the inflate mode). This means that such procedures as checking for leaks require the system to be in an active, pressurized state.

- **Basic vehicle air and power systems are not covered in this guide.**
  The Tire Pressure Control System requires air pressure and electrical power supply from the base vehicle systems. Diagnosis and service of these systems is outside the scope of this manual.

- **Some faults will halt inflate or deflate sequences.**
  Upon sensing some fault codes, the Tire Pressure Control System will immediately go to the "maintain" mode. This may cause mode arrows to stop flashing before the system has actually attained the pressures for the indicated mode.

Troubleshooting

Fault Codes

When an exclamation point(!) follows the digital display, the display is reporting a system fault. The following chart provides a brief overview of the Tire Pressure Control System fault codes and the affected system.

Fault Code	Code Type	System Status	Fault Cause
1C!	Power	No operation normal operation	Low power no power down
2C!	—	—	Not assigned
3C!	Speed sensor	Inflate only	Bad connection or no speed signal
4C!	Control communication	Inflate only	Bad connection from Electronic Control Unit to Operator Control Panel
5C!	Pressure transducer	No operation	No pressure transducer reading too high pressure transducer reading
6C!	—	—	Not assigned
7C!	Steer solenoid	No operation	Solenoid does not pass electrical diagnostics
8C!	Drive solenoid	No operation	Solenoid does not pass electrical diagnostics
9C!	Trailer solenoid	No operation	Solenoid does not pass electrical diagnostics
10C!	Supply solenoid	No operation	Solenoid does not pass electrical diagnostics
11C!	Deflate solenoid	No operation	Solenoid does not Pass electrical diagnostics
12C!	Control solenoid	No operation	Solenoid does not pass electrical diagnostics
13C!	Relay	No operation	Relay open or shorted
1P!	No deflate signal	Inflate only	No vacuum at Pneumatic Control Unit or in control line
2P!	—	—	Not assigned
3P!	Vacuum fault	No operation	Unintentional vacuum
4P!	Channel between modes	Pressure check only	Slow inflate or deflate
5P!	Pressure read low	Pressure check only	Quick loss of pressure
6P!	—	—	Not assigned
7P!	Inadequate air pressure	Pressure check only	High pressure switch does not close wet tank pressure does not rise
8P!	Atmospheric	Pressure check only	Vent pressure is outside range
9P!	Trend fault	Channel inoperative	Channel loses pressure in inflate mode
10P!	Tire leak (confirm)	Channel inoperative	Channel fails to confirm
11P!	Tire leak (imbalance)	Channel inoperative	One tire pressure lower than others

Troubleshooting

Code: **1C!**

Type: **Power**

System Mode	Condition	Possible Causes*
No Operation	Power out of range	• Low battery voltage • Poor ground connection to Electronic Control Unit • Poor switched ignition connection to Electronic Control Unit • High vehicle electrical system voltage • Faulty Electronic Control Unit
Normal operation	No power down (not displayed on Operator Control Panel, but stored as historical fault)	• Relay enable shorted to ground • Relay stuck ON • RSP1 shorted to battery • Faulty Electronic Control Unit

*Possible causes are listed in order of likely occurrence.

Code Description

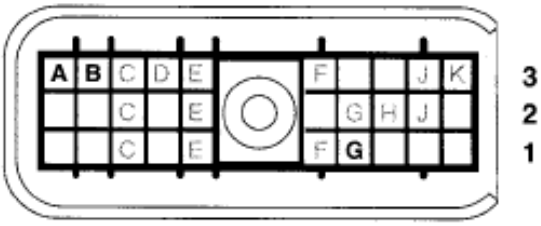
Code 1C! indicates a power fault and sets when the system power is outside the acceptable range of 9 to 32 Volts. The fault could be caused by low battery power or some other problem with the basic vehicle electrical system.

If the vehicle power system checks out satisfactorily, other possible causes include bad Electronic Control Unit (ECU) connections, a relay problem, or a faulty Electronic Control Unit.

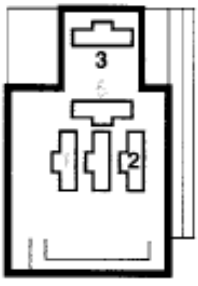
In inspecting circuits and connections for a Code 1C! fault, pay particular attention to a bad ground connection, which could be causing the fault.

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

ECU 30-way Harness Connector



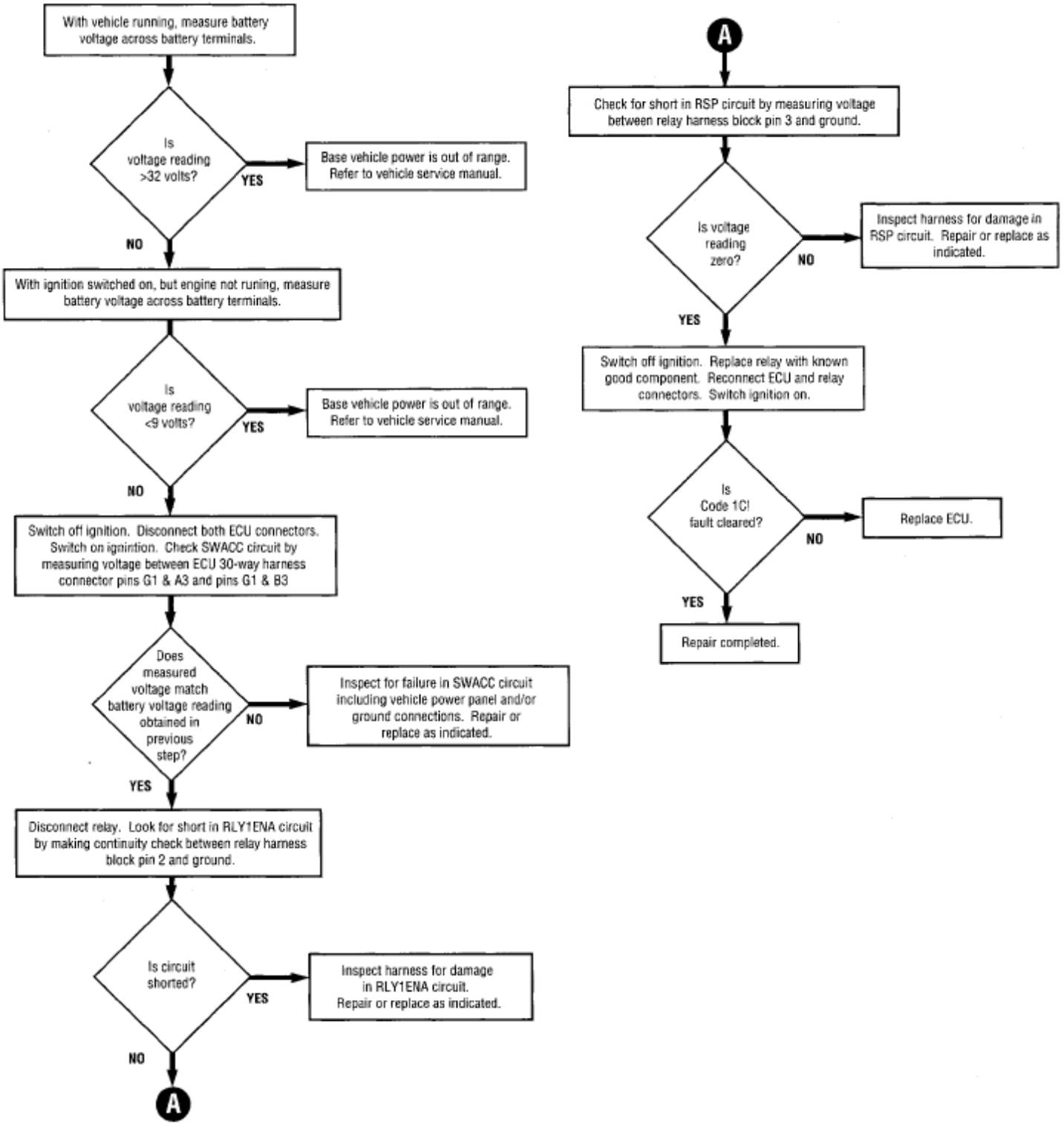
Relay Harness Block



Troubleshooting Tree

Code: **1C!**

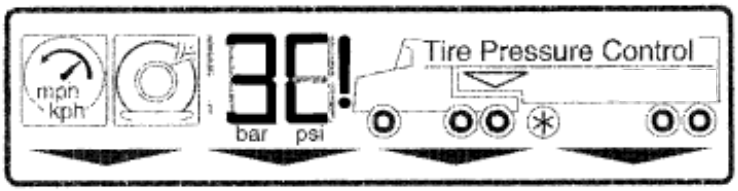
Type: **Power**


With vehicle running, measure battery voltage across battery terminals.
Is voltage reading >32 volts?
YES
Base vehicle power is out of range. Refer to vehicle service manual.
NO
With ignition switched on, but engine not runing, measure battery voltage across battery terminals.
Is voltage reading <9 volts?
YES
Base vehicle power is out of range. Refer to vehicle service manual.
NO
Switch off ignition. Disconnect both ECU connectors. Switch on ignintion. Check SWACC circuit by measuring voltage between ECU 30-way harness connector pins G1 & A3 and pins G1 & B3
Does measured voltage match battery voltage reading obtained in previous step?
NO
Inspect for failure in SWACC circuit including vehicle power panel and/or ground connections. Repair or replace as indicated.
YES
Disconnect relay. Look for short in RLY1ENA circuit by making continuity check between relay harness block pin 2 and ground.
Is circuit shorted?
YES
Inspect harness for damage in RLY1ENA circuit. Repair or replace as indicated.
NO
A
A
Check for short in RSP circuit by measuring voltage between relay harness block pin 3 and ground.
Is voltage reading zero?
NO
Inspect harness for damage in RSP circuit. Repair or replace as indicated.
YES
Switch off ignition. Replace relay with known good component. Reconnect ECU and relay connectors. Switch ignition on.
Is Code 1C! fault cleared?
NO
Replace ECU.
YES
Repair completed.

Troubleshooting

Code: 3C!

Type: Speed Sensor



System Mode	Condition	Possible Causes*
Inflate only	Bad connection	• Sensor disconnected or loose plug • Either speed sensor wire is open (broken wire) • Either speed sensor wire is shorted to ground (bare wire is touching the frame) • Faulty speed sensor • Faulty Electronic Control Unit
Inflate only	No speed signal	• Sensor actuation failure • Tang drive broken/disconnected on mechanical sensor • Gap not adjusted correctly on pole sensor • Vehicle started 15 to 20 times without being moved • Sensor wires shorted together

Code Description

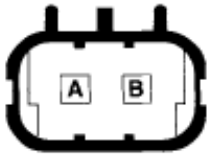
Code 3C! indicates a faulty speed sensor signal which can be set by one of two conditions:

- A wiring or sensor connection may cause a 3C! fault after approximately 15 seconds. Likely causes are wiring problems or bad connections.
- A mis-adjusted or faulty sensor may cause a 3C! fault after 15 to 20 ignition key cycles without any speed signal.

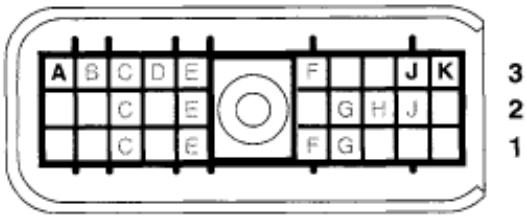
Note: This fault may occur if ignition has been cycled 15 to 20 times without moving the vehicle.

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Speed Sensor Harness Connector



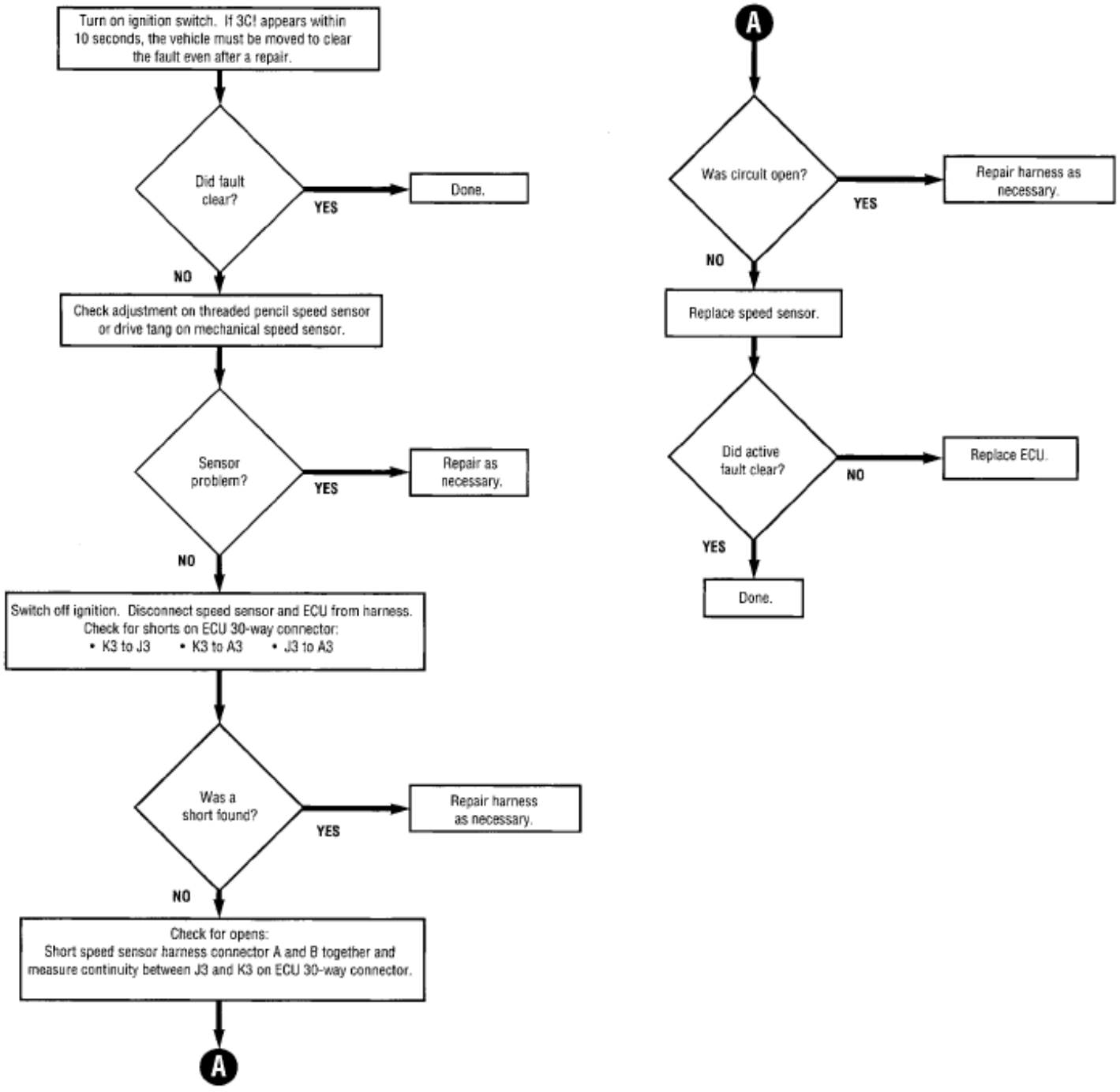
ECU 30-way Harness Connector



Troubleshooting Tree

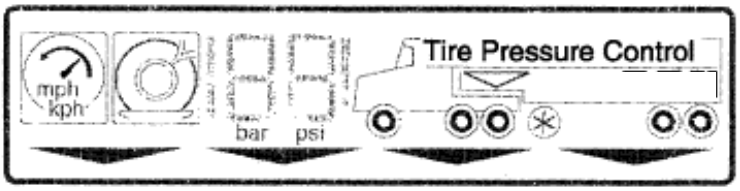
Code: **3C!**

Type: **Speed Sensor**


Turn on ignition switch. If 3C! appears within 10 seconds, the vehicle must be moved to clear the fault even after a repair.
Did fault clear?
YES
Done.
NO
Check adjustment on threaded pencil speed sensor or drive tang on mechanical speed sensor.
Sensor problem?
YES
Repair as necessary.
NO
Switch off ignition. Disconnect speed sensor and ECU from harness. Check for shorts on ECU 30-way connector:
• K3 to J3 • K3 to A3 • J3 to A3
Was a short found?
YES
Repair harness as necessary.
NO
Check for opens:
Short speed sensor harness connector A and B together and measure continuity between J3 and K3 on ECU 30-way connector.
A
A
Was circuit open?
YES
Repair harness as necessary.
NO
Replace speed sensor.
Did active fault clear?
NO
Replace ECU.
YES
Done.

Code: 4C!

Type: Control Communications



Logo Only or Blank Display

System Mode	Condition	Possible Causes*
Inflate Only	Blank Display	• No power to Operator Control Panel • No ground connection to Operator Control Panel • Faulty Operator Control Panel
Inflate Only	Operator Control Panel displays logo only (4C! not displayed on Operator Control Panel but stored as historical fault)	• Operator Control Panel to Electronic Control Unit lines open • Operator Control Panel to Electronic Control Unit lines shorted to ground • Operator Control Panel to Electronic Control Unit lines shorted to power • Operator Control Panel to Electronic Control Unit lines shorted together • Faulty Operator Control Panel • Faulty Electronic Control Unit

*Possible causes are listed in order of likely occurrence.

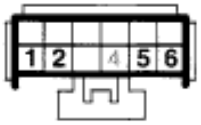
Code Description

Code 4C! indicates a communication problem between the Electronic Control Unit (ECU) and the Operator Control Panel (OCP). Code 4C! will only be observable on a diagnostic tool, it will not show on the Operator Control Panel. Instead, the Operator Control Panel may be blank (indicating a power problem) or may display only the logo (indicating a signal problem).

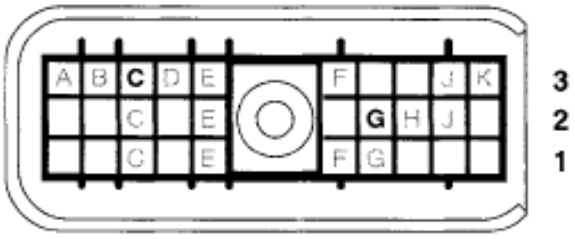
All of the troubleshooting steps for code 4C! involve checking the condition of Electronic Control Unit and the Operator Control Panel circuits. If no circuit problems are found, Code 4C! indicates either a faulty Operator Control Panel or a faulty Electronic Control Unit.

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Operator Control Panel Harness Connector



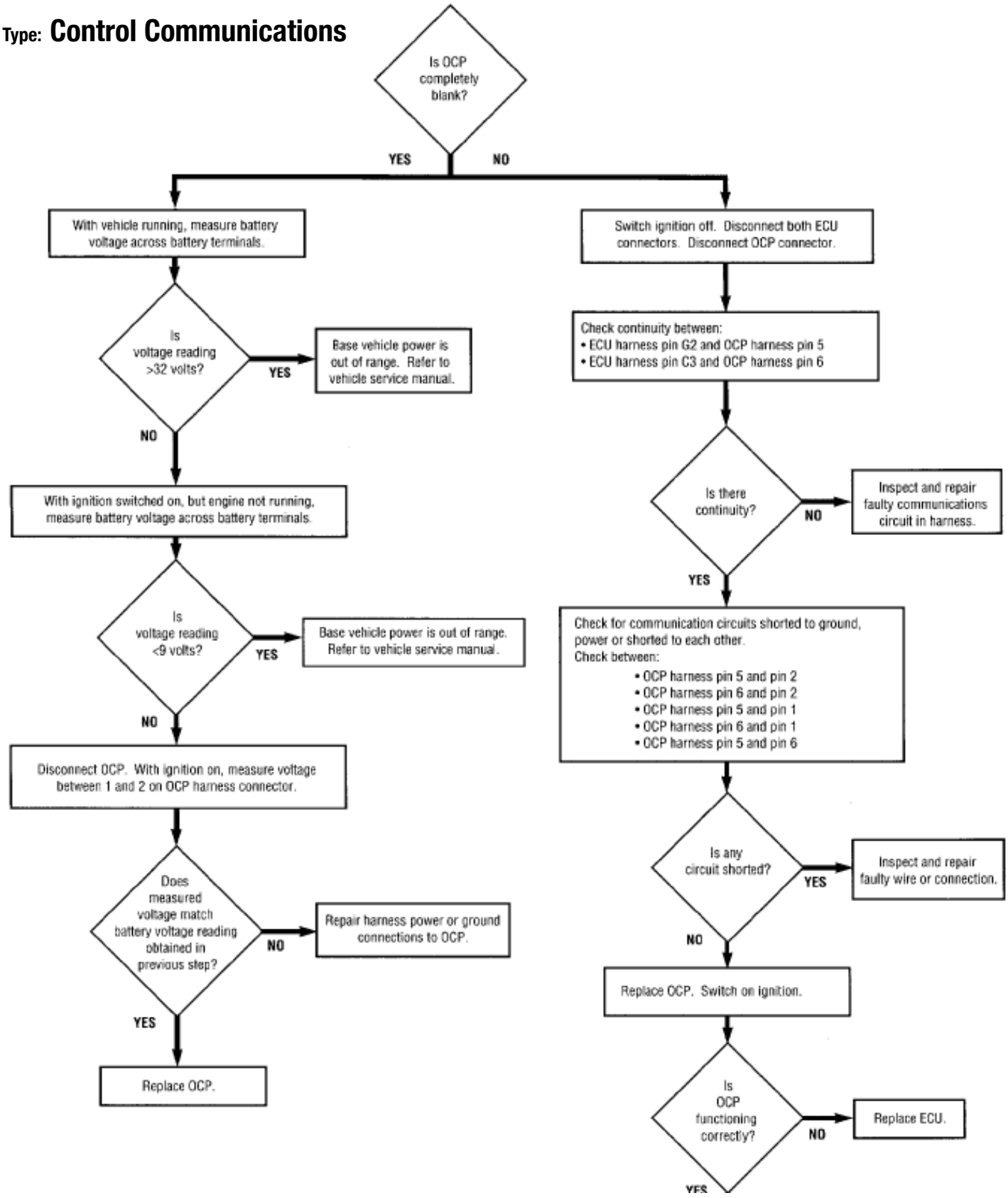
ECU 30-way Harness Connector



Troubleshooting Tree

Code: **4C!**

Type: **Control Communications**


Is OCP completely blank?
YES
NO
With vehicle running, measure battery voltage across battery terminals.
Is voltage reading >32 volts?
YES
Base vehicle power is out of range. Refer to vehicle service manual.
NO
With ignition switched on, but engine not running, measure battery voltage across battery terminals.
Is voltage reading <9 volts?
YES
Base vehicle power is out of range. Refer to vehicle service manual.
NO
Disconnect OCP. With ignition on, measure voltage between 1 and 2 on OCP harness connector.
Does measured voltage match battery voltage reading obtained in previous step?
NO
Repair harness power or ground connections to OCP.
YES
Replace OCP.
Switch ignition off. Disconnect both ECU connectors. Disconnect OCP connector.
Check continuity between:
• ECU harness pin G2 and OCP harness pin 5
• ECU harness pin C3 and OCP harness pin 6
Is there continuity?
NO
Inspect and repair faulty communications circuit in harness.
YES
Check for communication circuits shorted to ground, power or shorted to each other.
Check between:
• OCP harness pin 5 and pin 2
• OCP harness pin 6 and pin 2
• OCP harness pin 5 and pin 1
• OCP harness pin 6 and pin 1
• OCP harness pin 5 and pin 6
Is any circuit shorted?
YES
Inspect and repair faulty wire or connection.
NO
Replace OCP. Switch on ignition.
Is OCP functioning correctly?
NO
Replace ECU.
YES

Troubleshooting

Code: 5C!

Type: Pressure Transducer

System Mode	Condition	Possible Causes*
No operation	No pressure transducer reading	• Transducer electrically disconnected • Pressure signal wire open • Pressure signal wire shorted to ground • Pressure transducer Vref wire open • Pressure transducer Vref wire shorted to ground • Pressure transducer ground wire open • Faulty transducer • Faulty Electronic Control Unit
No operation	High pressure transducer reading	• Pressure signal wire shorted to Vbat or Vref • Faulty transducer • Faulty Electronic Control Unit

*Possible causes are listed in order of likely occurrence.

Code Description

Code 5C! displays when the Electronic Control Unit (ECU) receives an unusually high or low reading from the pressure transducer. A diagnostic tool will specify which of the two conditions is responsible for setting the code.

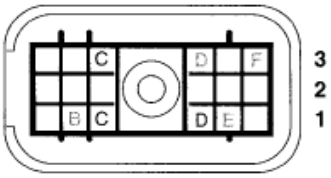
Initial troubleshooting steps involve checking for a shorted-to-ground or an open pressure transducer circuit.

If the circuits check out OK, secondary causes could involve a faulty transducer or a faulty Electronic Control Unit.

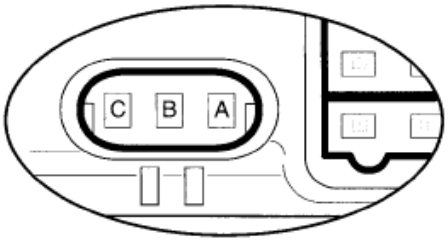
See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Pressure Transducer Harness Connector

ECU 18-way Harness Connector



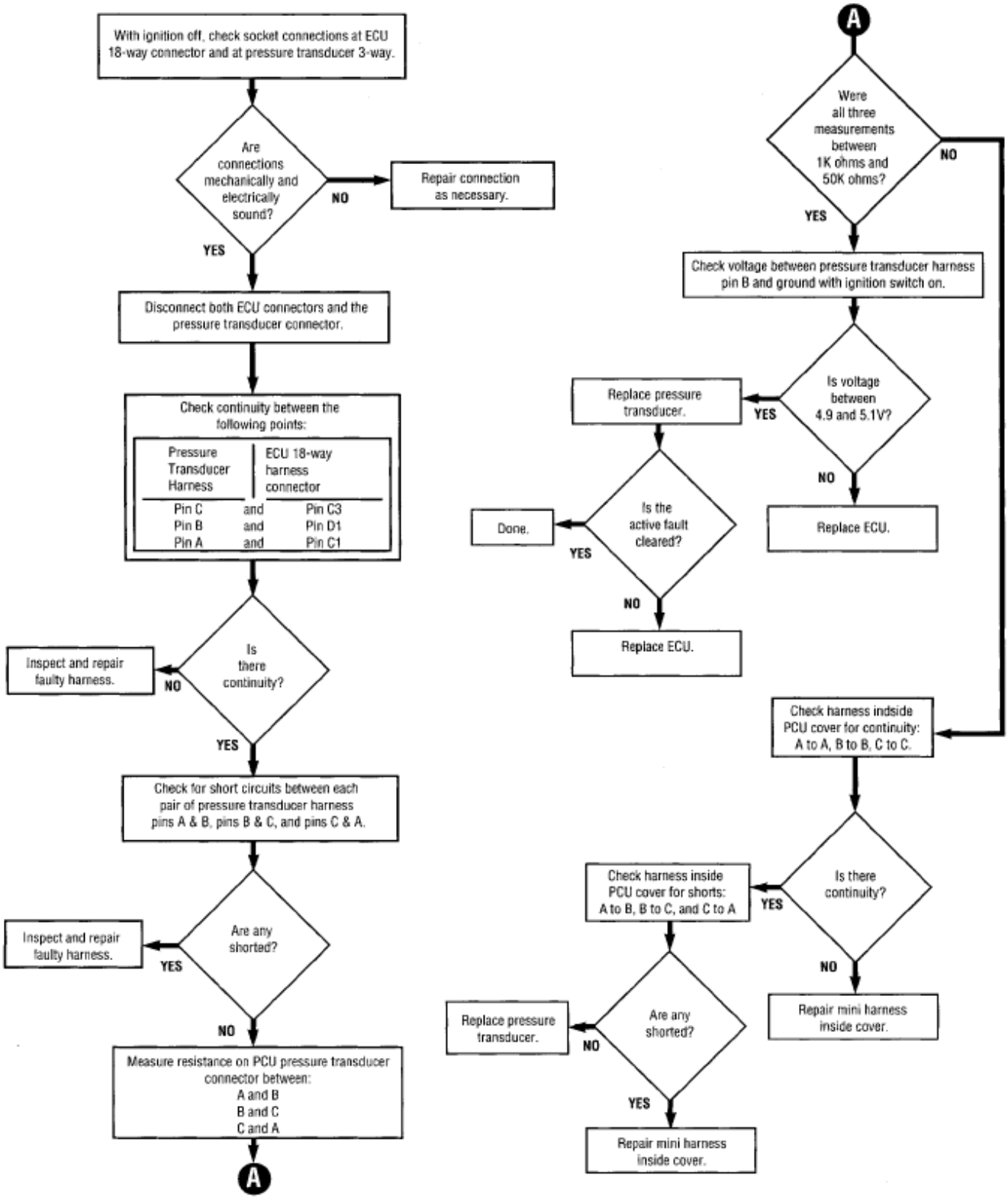
Pressure Transducer Connector



Troubleshooting Tree

Code: 5C!

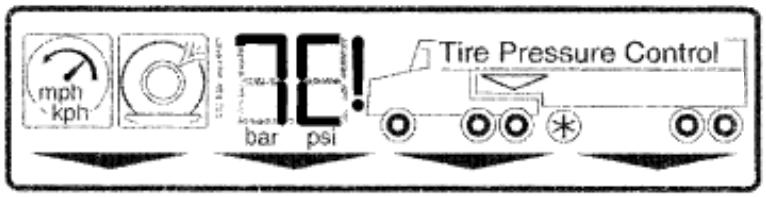
Type: Pressure Transducer


With ignition off, check socket connections at ECU 18-way connector and at pressure transducer 3-way.
Are connections mechanically and electrically sound?
NO
Repair connection as necessary.
YES
Disconnect both ECU connectors and the pressure transducer connector.
Check continuity between the following points:
Pressure Transducer Harness
ECU 18-way harness connector
Pin C and Pin C3
Pin B and Pin D1
Pin A and Pin C1
Is there continuity?
NO
Inspect and repair faulty harness.
YES
Check for short circuits between each pair of pressure transducer harness pins A & B, pins B & C, and pins C & A.
Are any shorted?
YES
Inspect and repair faulty harness.
NO
Measure resistance on PCU pressure transducer connector between:
A and B
B and C
C and A
A
A
Were all three measurements between 1K ohms and 50K ohms?
NO
YES
Check voltage between pressure transducer harness pin B and ground with ignition switch on.
Is voltage between 4.9 and 5.1V?
YES
Replace pressure transducer.
NO
Replace ECU.
Is the active fault cleared?
YES
Done.
NO
Replace ECU.
Check harness indside PCU cover for continuity: A to A, B to B, C to C.
Is there continuity?
YES
Check harness inside PCU cover for shorts: A to B, B to C, and C to A
NO
Repair mini harness inside cover.
Are any shorted?
NO
Replace pressure transducer.
YES
Repair mini harness inside cover.

Code: 7C!, 8C!, 9C!, 10C!, 11C!, 12C!

Type: Solenoids

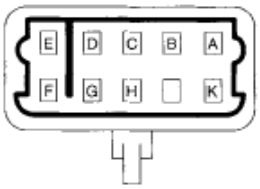
7C = Steer
8C = Drive
9C = Trailer
10C = Supply
11C = Deflate
12C = Control



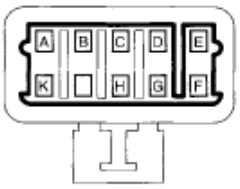
System Mode	Condition	Possible Causes*
No operation	Pneumatic Control Unit solenoid failed electrical diagnostic test	• Solenoid wire open • Solenoid wire shorted to ground • Solenoid wire shorted to power • RSP 1 or RSP 2 open or shorted to ground • Faulty solenoid • Faulty Electronic Control Unit

*Possible causes are listed in order of likely occurrence.

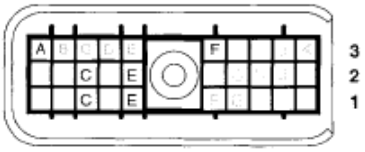
PCU Connector



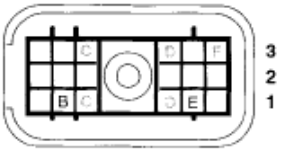
PCU Harness Connector



ECU 30-way Harness Connector



ECU 18-way Harness Connector



Code Description

Codes 7C! through 12C! indicate an electrical fault in the Pressure Control Unit (PCU). System operation is disabled when these faults are detected.

The system shuts down in a fail-safe mode and turns off the relay power to the solenoids.

The troubleshooting tree first tests internal solenoid circuitry. Resistance outside the specified range of 7 to 25 ohms indicates a defective solenoid. Succeeding steps check continuity of the wire harness circuits between the Pneumatic Control Unit and the Electronic Control Unit (ECU). If the problem can be traced to a faulty circuit or connector, make the necessary repairs. If the troubleshooting routine leads to a problem with the solenoid itself, the Pneumatic Control Unit must be repaired or replaced. If both the solenoid and the circuitry check out OK, the Electronic Control Unit is faulty.

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Troubleshooting Tree

Code: 7C!, 8C!, 9C!, 10C!, 11C!, 12C!

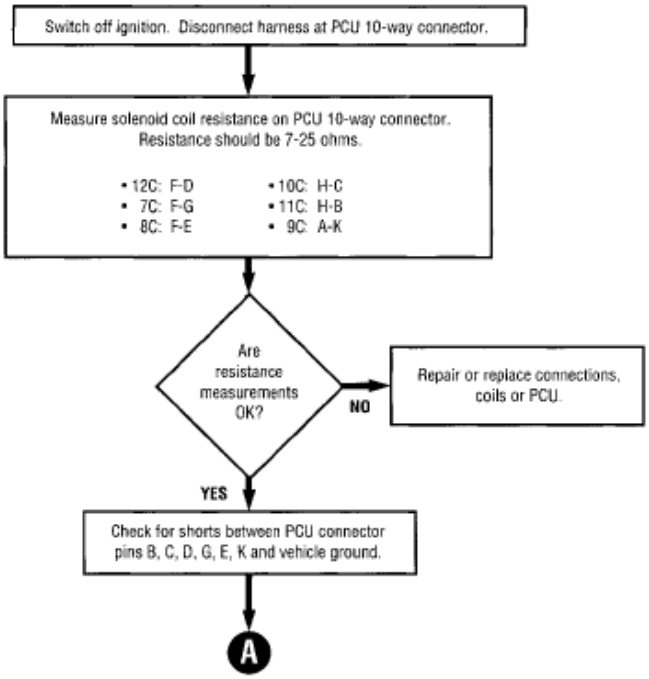
Type: Solenoids

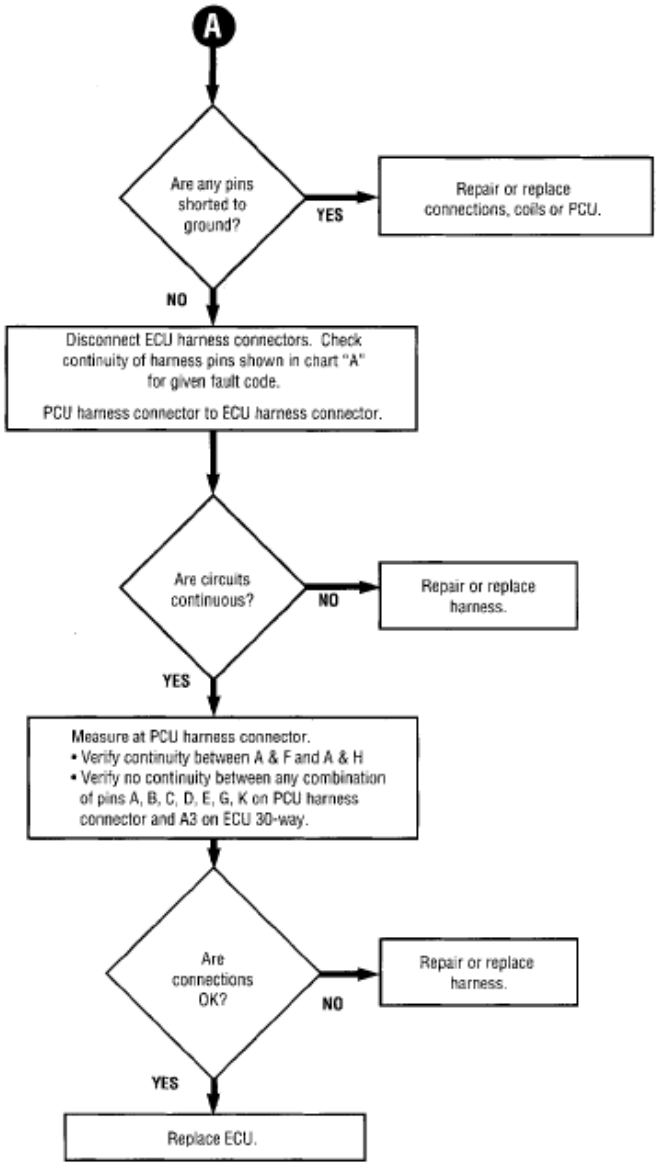
7C = Steer
8C = Drive
9C = Trailer
10C = Supply
11C = Deflate
12C = Control

Each of the codes 7C! through 12C! matches one specific solenoid. When the troubleshooting instructions refer to connector test points, use Chart A to select the pin test point for use with the particular fault code you are diagnosing. See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

CHART “A” Solenoid Wire Test Points

Fault Code	Any Fault	Any Fault	7C	8C	9C		10C	11C	12C
PCU Harness Connector	H	F	G	E	K	A	C	B	D
ECU Harness Connector	E1 30 Way	E1 30 Way	C2 30 Way	E2 30 Way	B1 18 Way	E1 30 Way	F3 30 Way	E1 18 Way	C1 30 Way

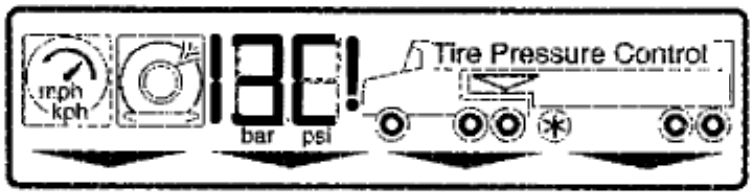

Switch off ignition. Disconnect harness at PCU 10-way connector.
Measure solenoid coil resistance on PCU 10-way connector. Resistance should be 7-25 ohms.
• 12C: F-D
• 7C: F-G
• 8C: F-E
• 10C: H-C
• 11C: H-B
• 9C: A-K
Are resistance measurements OK?
NO
Repair or replace connections, coils or PCU.
YES
Check for shorts between PCU connector pins B, C, D, G, E, K and vehicle ground.
A


A
Are any pins shorted to ground?
YES
Repair or replace connections, coils or PCU.
NO
Disconnect ECU harness connectors. Check continuity of harness pins shown in chart "A" for given fault code.
PCU harness connector to ECU harness connector.
Are circuits continuous?
NO
Repair or replace harness.
YES
Measure at PCU harness connector.
• Verify continuity between A & F and A & H
• Verify no continuity between any combination of pins A, B, C, D, E, G, K on PCU harness connector and A3 on ECU 30-way.
Are connections OK?
NO
Repair or replace harness.
YES
Replace ECU.

Troubleshooting

Code: **13C!**

Type: **Relay**



System Mode	Condition	Possible Causes*
No operation	Relay open	• Blown VBAT fuse • Faulty relay or socket • Relay enable open • Relay enable shorted to VBAT • Faulty Electronic Control Unit
No operation	Relay shorted	• Relay enable shorted to ground

*Possible causes are listed in order of likely occurrence.

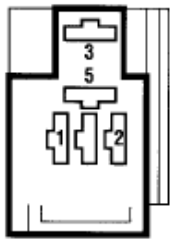
Code Description

Code 13C! indicates a relay problem. Likely causes are either a blown VBATT fuse, the relay itself, or problems with the relay enable circuit.

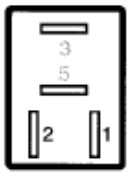
After checking the VBATT fuse, an easy second step is to swap a known good relay and see if the fault is cleared. If the fuse, the relay, and the relay enable circuit all check out OK, the likely cause of the problem is a faulty Electronic Control Unit (ECU).

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

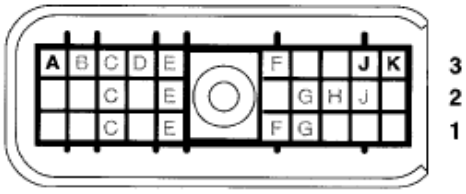
Relay Harness Block



Relay



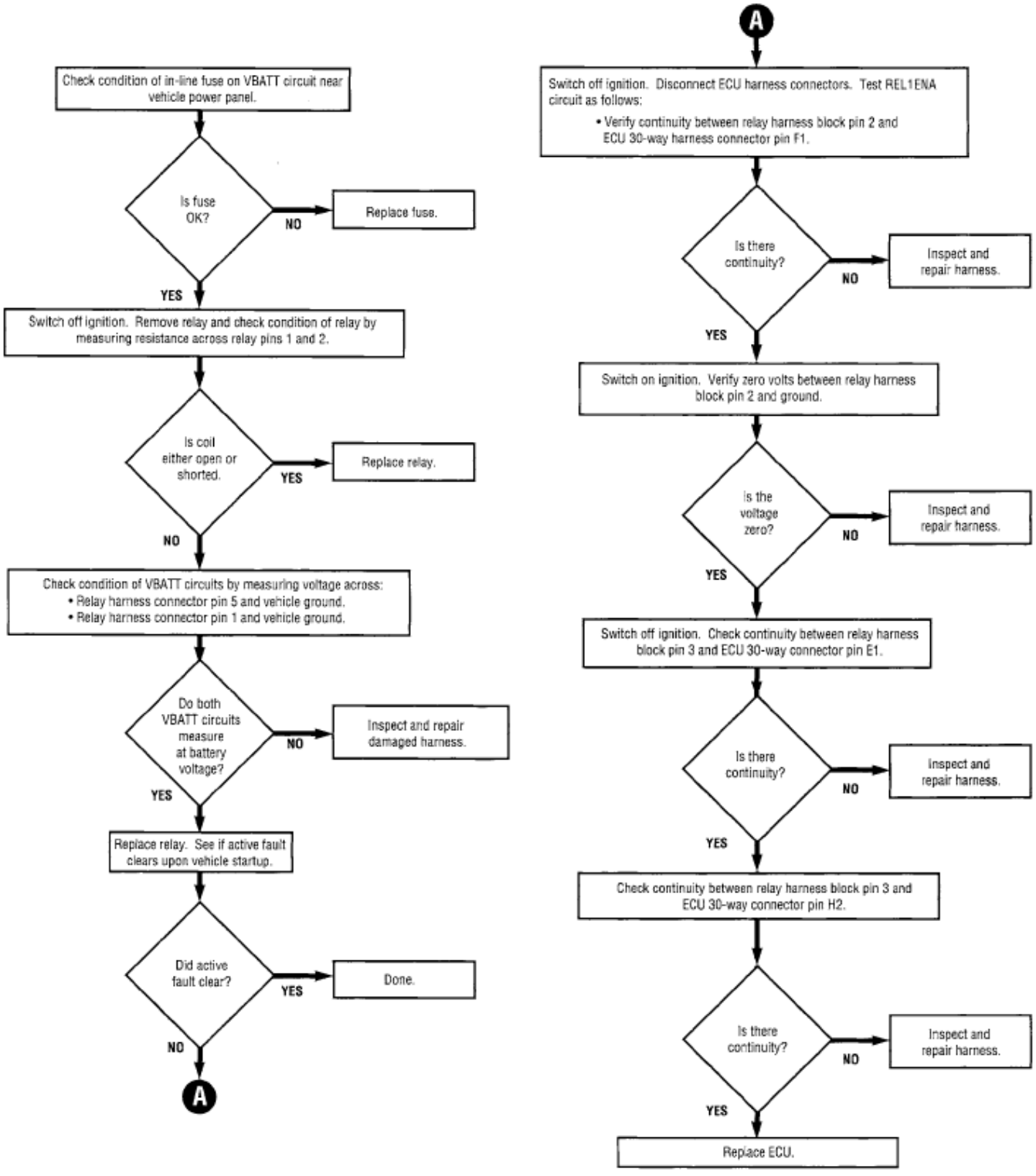
ECU 30-way Harness Connector



Troubleshooting Tree

Code: **13C!**

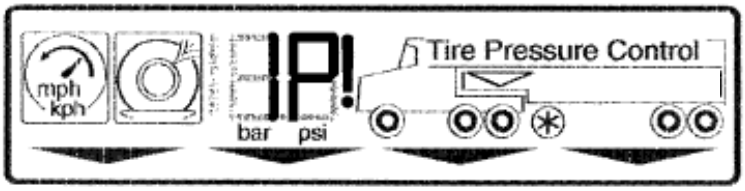
Type: **Relay**


Check condition of in-line fuse on VBATT circuit near vehicle power panel.
Is fuse OK?
NO
Replace fuse.
YES
Switch off ignition. Remove relay and check condition of relay by measuring resistance across relay pins 1 and 2.
Is coil either open or shorted.
YES
Replace relay.
NO
Check condition of VBATT circuits by measuring voltage across:
• Relay harness connector pin 5 and vehicle ground.
• Relay harness connector pin 1 and vehicle ground.
Do both VBATT circuits measure at battery voltage?
NO
Inspect and repair damaged harness.
YES
Replace relay. See if active fault clears upon vehicle startup.
Did active fault clear?
YES
Done.
NO
A
A
Switch off ignition. Disconnect ECU harness connectors. Test REL1ENA circuit as follows:
• Verify continuity between relay harness block pin 2 and ECU 30-way harness connector pin F1.
Is there continuity?
NO
Inspect and repair harness.
YES
Switch on ignition. Verify zero volts between relay harness block pin 2 and ground.
Is the voltage zero?
NO
Inspect and repair harness.
YES
Switch off ignition. Check continuity between relay harness block pin 3 and ECU 30-way connector pin E1.
Is there continuity?
NO
Inspect and repair harness.
YES
Check continuity between relay harness block pin 3 and ECU 30-way connector pin H2.
Is there continuity?
NO
Inspect and repair harness.
YES
Replace ECU.

Troubleshooting

Code: 1P!

Type: No Deflate Signal



System Mode	Condition	Possible Causes*
Inflate only	Inadequate vacuum in the Pneumatic Control Unit	• Plugged or restricted Pneumatic Control Unit vent line • Faulty Pneumatic Control Unit
Inflate only	No sustained vacuum in control lines	• Line leaks • Air seals, oil lip seals

*Possible causes are listed in order of likely occurrence.

Code Description

Code 1P! indicates inadequate vacuum in the Pneumatic Control Unit (PCU) prior to channel selection or failure to sustain a vacuum in a control line following channel selection. Code 1P! will be set when the nominal vacuum of 26" Hg drops to 20" Hg. Code 1P! can be generated by one channel or multiple channels.

When a deflate is requested, the system first shuts off all the channel control lines and generates a vacuum in the Pneumatic Control Unit alone. A failure to generate this vacuum will result in a 1P!.

Once the vacuum has been established in the Pneumatic Control Unit, the desired channel control line(s) are opened and a vacuum is generated in them. If the system fails to generate a vacuum in the control lines after two attempts, it will log a 1P! fault.

Note: If a fault occurs on any channel, deflation is disabled for all channels.

Code 1P! can be caused by:

- Faulty Pneumatic Control Unit
- Plugged or restricted Pneumatic Control Unit vent line
- Line leak
- Air seal or oil lip seal leaks.

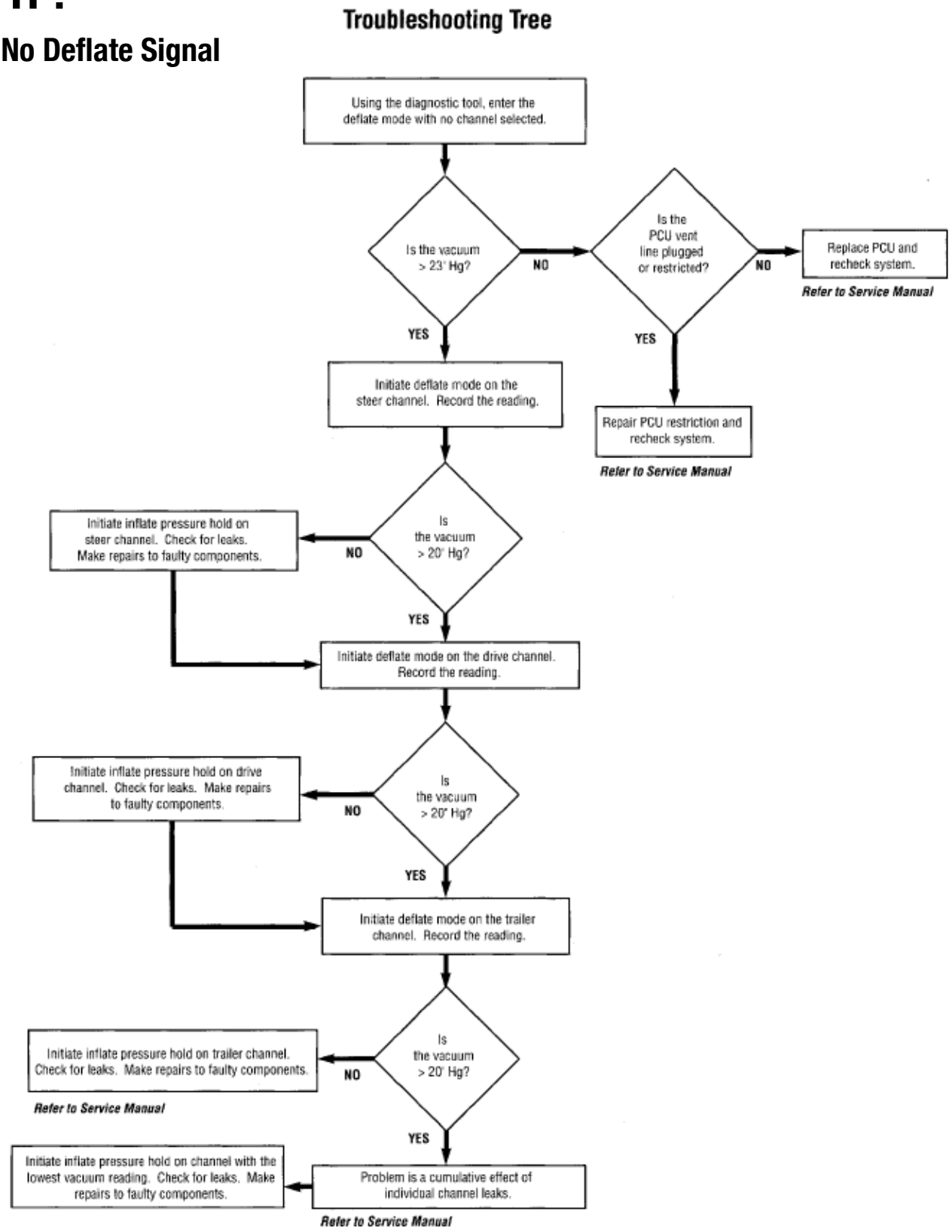
To correctly diagnose the faulty component, connect the Diagnostic Tool (see Section 5 for test equipment and descriptions) and follow the procedure in the 1P! troubleshooting tree.

See "Troubleshooting Tips" on page 20 for general guidelines on system diagnostics.

Troubleshooting Tree

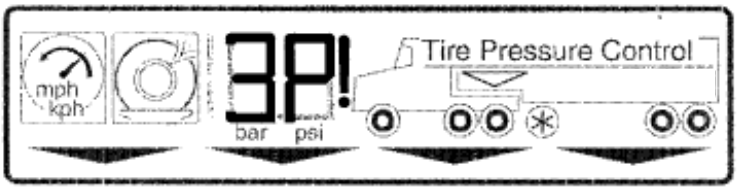
Code: **1P!**

Type: **No Deflate Signal**


Troubleshooting Tree
Using the diagnostic tool, enter the deflate mode with no channel selected.
Is the vacuum > 23" Hg?
NO
Is the PCU vent line plugged or restricted?
NO
Replace PCU and recheck system.
Refer to Service Manual
YES
YES
Initiate deflate mode on the steer channel. Record the reading.
Repair PCU restriction and recheck system.
Refer to Service Manual
Is the vacuum > 20" Hg?
NO
Initiate inflate pressure hold on steer channel. Check for leaks. Make repairs to faulty components.
YES
Initiate deflate mode on the drive channel. Record the reading.
Is the vacuum > 20" Hg?
NO
Initiate inflate pressure hold on drive channel. Check for leaks. Make repairs to faulty components.
YES
Initiate deflate mode on the trailer channel. Record the reading.
Is the vacuum > 20" Hg?
NO
Initiate inflate pressure hold on trailer channel. Check for leaks. Make repairs to faulty components.
Refer to Service Manual
YES
Problem is a cumulative effect of individual channel leaks.
Initiate inflate pressure hold on channel with the lowest vacuum reading. Check for leaks. Make repairs to faulty components.
Refer to Service Manual

Code: **3P!**

Type: **Vacuum Fault**



System Mode	Condition	Cause
No operation	Vacuum generation	• Faulty Pneumatic Control Unit

Code Description

Code 3P! displays when the system is generating a vacuum at a time when the Electronic Control Unit (ECU) is not requesting a vacuum. Creating an unexpected vacuum is a highly unlikely event. If it should occur, vacuum may cause a pressure drop in the wet tank.

The most likely cause of an unexpected vacuum is a faulty Pneumatic Control Unit (PCU). Verify the problem before replacing the Pneumatic Control Unit. See the procedure in the 3P! troubleshooting tree.

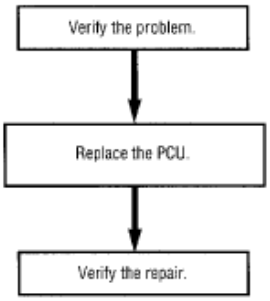
See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Troubleshooting Tree

Code: **3P!**

Type: **Vacuum Fault**

PROCEDURE:



Code: 4P!

Type: Channel Between Modes

System Mode	Condition	Possible Causes*
Pressure check only	Slow inflate	• Faulty compressor • Restricted flow at wheel valve air filters • Crimped or plugged lines
Pressure check only	Slow deflate	• Restricted flow at wheel valve air filters • Plugged or restricted wheel valve exhaust port • Leaking lines • Plugged or restricted Pneumatic Control Unit vent port

*Possible causes are listed in order of likely occurrence.

Code Description

Code 4P! displays if a channel inflates or deflates too slowly. The maximum allotted time for each channel is 40 minutes for an inflate, or 20 minutes for a deflate. The most likely cause is a faulty compressor or similar problem resulting in inadequate air supply to the Tire Pressure Control System.

If the system is able to generate a sufficient air supply, Code 4P! means that a leak or restriction exists in an air passage. The components that may contain a restricted or leaking air passage include:

- Wheel valve air filters
- Pneumatic Control Unit (PCU) vent port restriction
- Air supply lines
- Wheel valve exhaust port (deflate mode only)

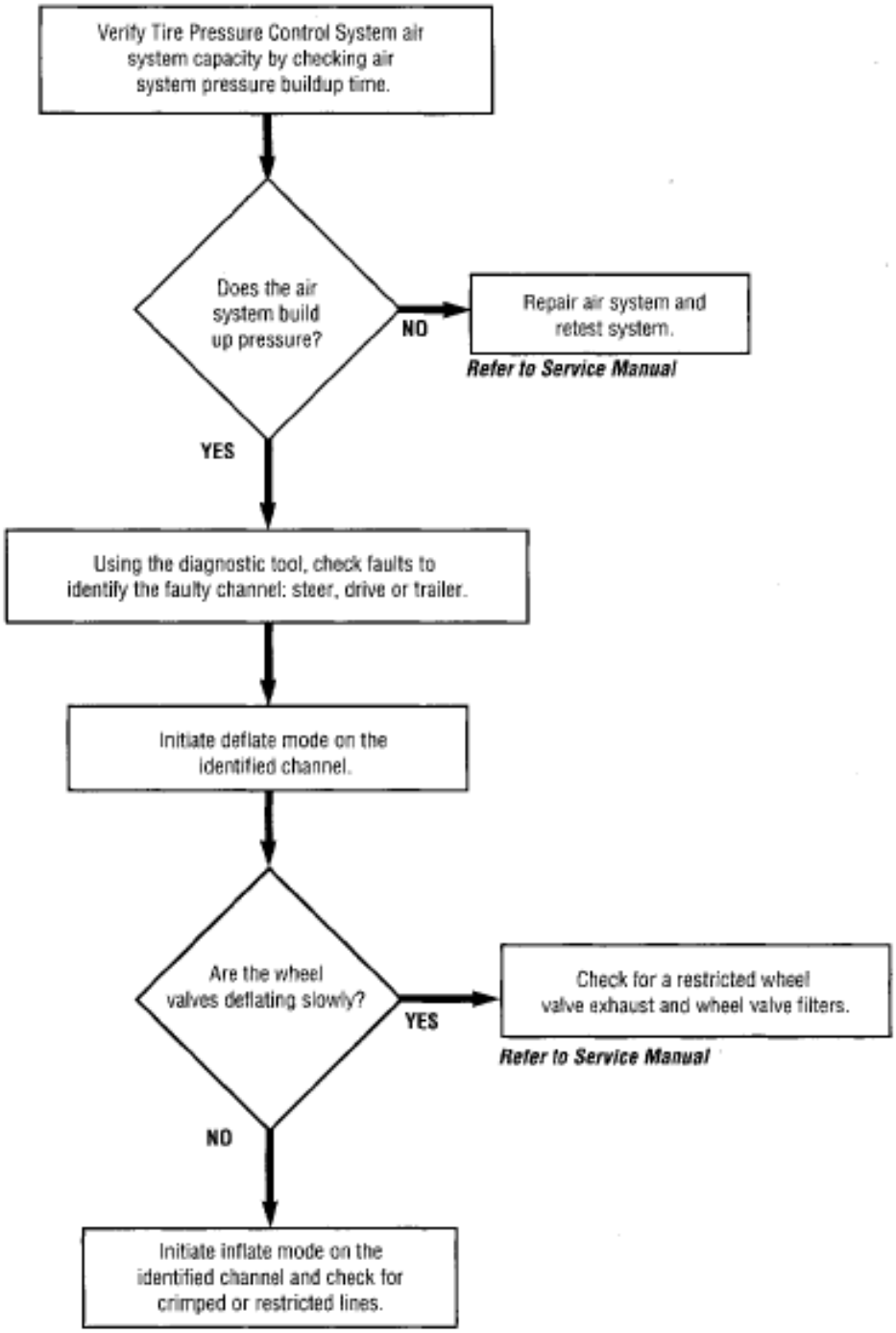
To correctly diagnose the faulty component, connect the Diagnostic Tool (see Section 5 for test equipment and descriptions) and follow the procedure in the 3P! troubleshooting tree.

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Troubleshooting Tree

Code: **4P!**

Type: **Channel Between Modes**


Verify Tire Pressure Control System air system capacity by checking air system pressure buildup time.
Does the air system build up pressure?
NO
Repair air system and retest system.
Refer to Service Manual
YES
Using the diagnostic tool, check faults to identify the faulty channel: steer, drive or trailer.
Initiate deflate mode on the identified channel.
Are the wheel valves deflating slowly?
YES
Check for a restricted wheel valve exhaust and wheel valve filters.
Refer to Service Manual
NO
Initiate inflate mode on the identified channel and check for crimped or restricted lines.

Troubleshooting

Code: 5P!

Type: Low Pressure Reading

System Mode	Condition	Possible Causes*
Pressure check only	Extreme pressure loss	• Open line from Pneumatic Control Unit to channel • Pressure switch failure, shorted closed • Pneumatic Control Unit failure, supply or control off • Crimped or plugged line between wet tank and Pneumatic Control Unit • Faulty pressure transducer • Faulty Electronic Control Unit

*Possible causes are listed in order of likely occurrence.

Air Pressure Check

Note that the Tire Pressure Control System is not continuously pressurized; pressure checks occur on a periodic basis. During tire pressure checks, the system delivers compressed air to each channel for approximately two seconds while monitoring the pressure in that channel.

Code Description

Code 5P! indicates an extreme pressure loss. The most likely cause is an open line which would have a clearly audible leak during inflation. A secondary cause could be a faulty pressure switch failing to open at wet tank pressures below 80 psi.

Other components that can cause a code 5P! are:

- Faulty Pneumatic Control Unit (PCU)
- Restricted line between the wet tank and
- Pneumatic Control Unit
- Faulty pressure transducer
- Open line from Pneumatic Control Unit to channel

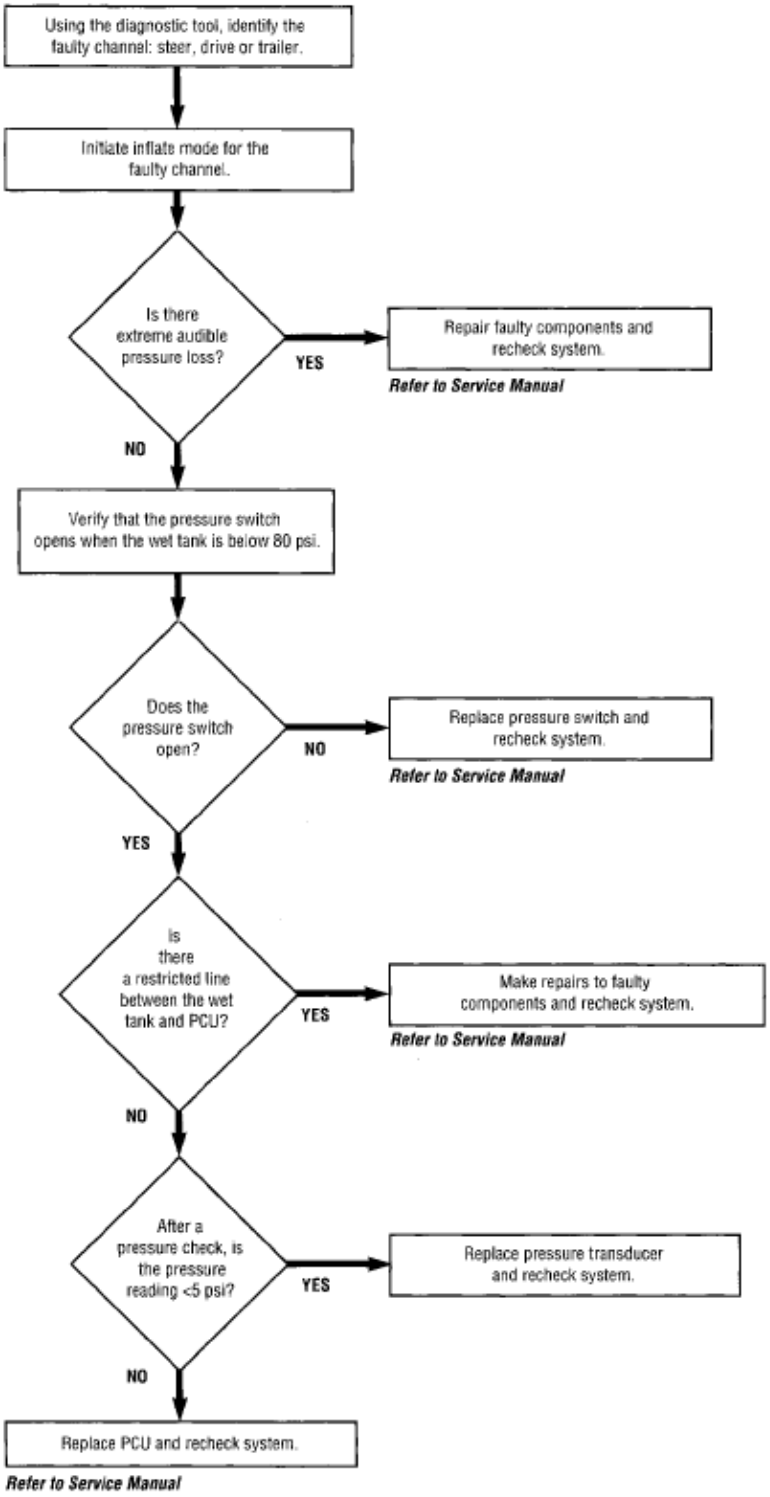
To correctly diagnose the faulty component, connect the Diagnostic Tool (see Section 5 for test equipment and descriptions) and follow the procedure in the 4P! troubleshooting tree.

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Troubleshooting Tree

Code: **5P!**

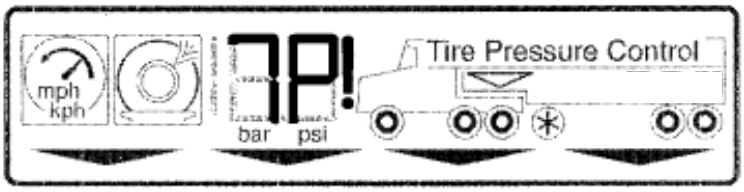
Type: **Low Pressure Reading**


Using the diagnostic tool, identify the faulty channel: steer, drive or trailer.
Initiate inflate mode for the faulty channel.
Is there extreme audible pressure loss?
YES
Repair faulty components and recheck system.
Refer to Service Manual
NO
Verify that the pressure switch opens when the wet tank is below 80 psi.
Does the pressure switch open?
NO
Replace pressure switch and recheck system.
Refer to Service Manual
YES
Is there a restricted line between the wet tank and PCU?
YES
Make repairs to faulty components and recheck system.
Refer to Service Manual
NO
After a pressure check, is the pressure reading <5 psi?
YES
Replace pressure transducer and recheck system.
NO
Replace PCU and recheck system.
Refer to Service Manual

Troubleshooting

Code: 7P!

Type: Inadequate Air Pressure



System Mode	Condition	Possible Causes*
Pressure check only	Pressure switch won't close	• Compressor governor cut-out set too low • Air dryer needs service • Pressure switch unplugged • Faulty pressure switch • Faulty compressor • Open or broken line from wet tank to Pneumatic Control Unit • Crimped or plugged line from wet tank to Pneumatic Control Unit • Faulty Electronic Control Unit
Pressure check only	Wet tank pressure too low	• Faulty compressor • Leaking lines

*Possible causes are listed in order of likely occurrence.

Air Pressure Check

Note that the Tire Pressure Control System is not continuously pressurized; pressure checks occur on a periodic basis. During tire pressure checks, the system delivers compressed air to each channel for approximately two seconds while monitoring the pressure in that channel.

Code Description

Code 7P! displays if system air pressure is inadequate to perform a tire pressure check.

Code 7P! displays when either the pressure switch will not close or the wet tank pressure is too low. The components that can cause the pressure switch to remain open include:

- Compressor governor cut-out set too low
- Air dryer needs service
- Pressure switch unplugged
- Faulty pressure switch
- Faulty compressor
- Open or broken line from wet tank to Pneumatic Control Unit
- Crimped or plugged line from wet tank to
- Pneumatic Control Unit
- Faulty Electronic Control Unit.

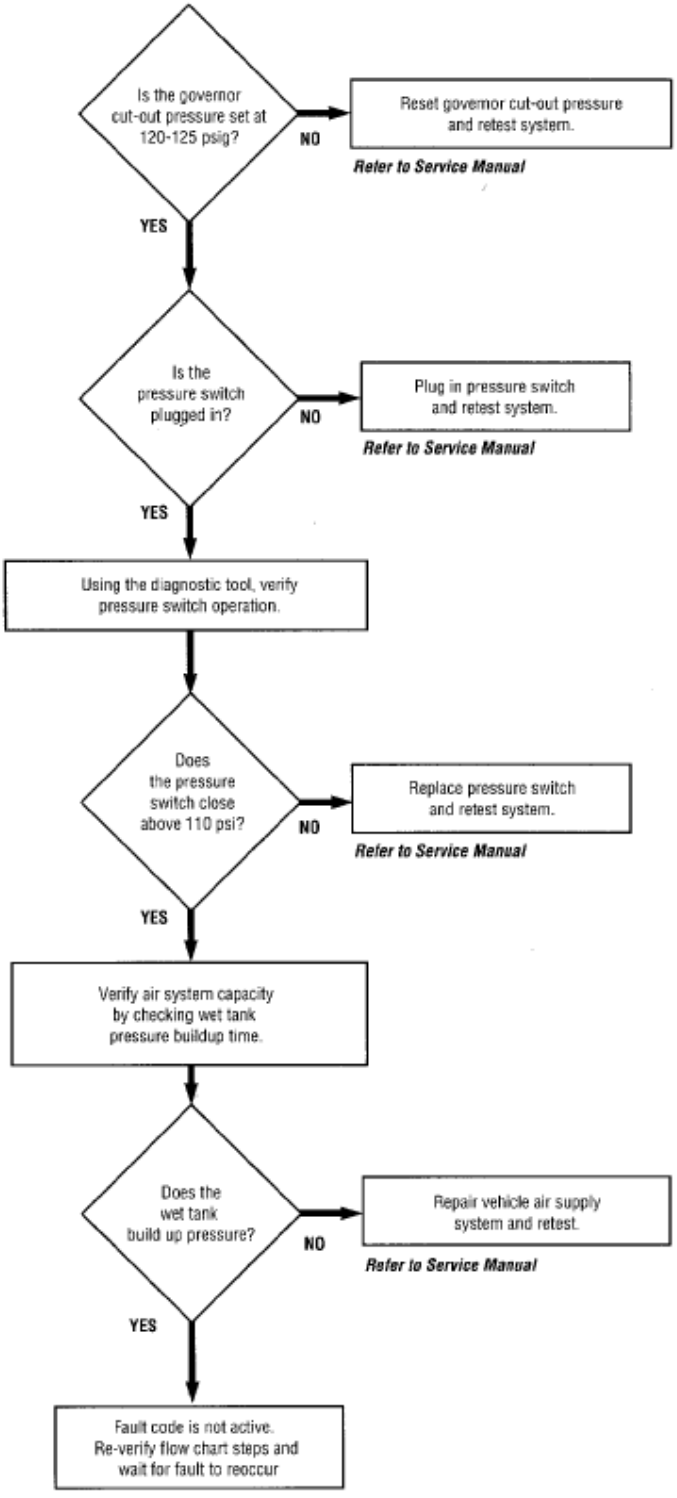
To correctly diagnose the faulty component, connect the Diagnostic Tool (see Section 5 for test equipment and descriptions) and follow the procedure in the 7P! troubleshooting tree.

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Troubleshooting Tree

Code: **7P!**

Type: **Inadequate Air Pressure**


Is the governor cut-out pressure set at 120-125 psig?
NO
Reset governor cut-out pressure and retest system.
Refer to Service Manual
YES
Is the pressure switch plugged in?
NO
Plug in pressure switch and retest system.
Refer to Service Manual
YES
Using the diagnostic tool, verify pressure switch operation.
Does the pressure switch close above 110 psi?
NO
Replace pressure switch and retest system.
Refer to Service Manual
YES
Verify air system capacity by checking wet tank pressure buildup time.
Does the wet tank build up pressure?
NO
Repair vehicle air supply system and retest.
Refer to Service Manual
YES
Fault code is not active. Re-verify flow chart steps and wait for fault to reoccur

Troubleshooting

Code: 8P!

Type: Atmospheric

System Mode	Condition	Possible Causes*
Pressure check only	Pneumatic Control Unit pressure out of range	• Faulty pressure transducer • Faulty Pneumatic Control Unit • Faulty Electronic Control Unit

*Possible causes are listed in order of likely occurrence.

Air Pressure Check

Note that the Tire Pressure Control System is not continuously pressurized; pressure checks occur on a periodic basis. During tire pressure checks, the system delivers compressed air to each channel for approximately two seconds while monitoring the pressure in that channel.

Code Description

Code 8P! displays if the atmospheric pressure reading is out of range. The atmospheric pressure reading can be out of range as a result of air bleeding back into the Pneumatic Control Unit (PCU) or because of a faulty pressure transducer.

The components that can cause a code 8P! to be set include:

- Faulty pressure transducer
- Faulty Pneumatic Control Unit
- Faulty Electronic Control Unit (ECU).

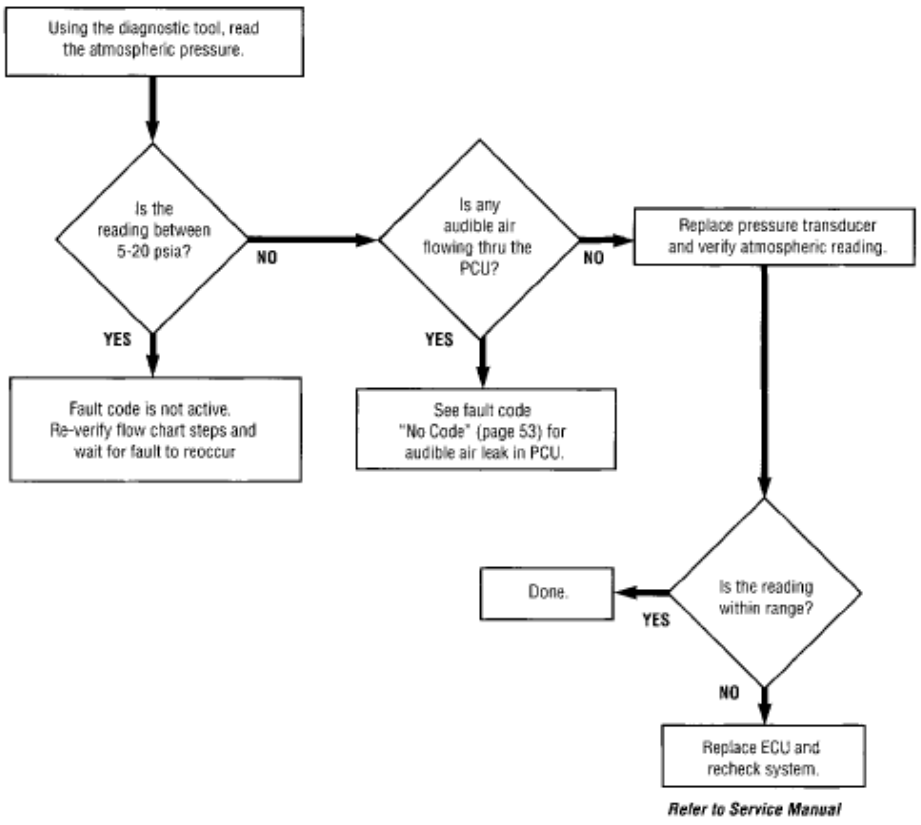
To correctly diagnose the faulty component, connect the Diagnostic Tool (see Section 5 for test equipment and descriptions) and follow the procedure in the 8P! troubleshooting tree.

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Troubleshooting Tree

Code: **8P!**

Type: **Atmospheric**


Using the diagnostic tool, read the atmospheric pressure.
Is the reading between 5-20 psia?
NO
YES
Is any audible air flowing thru the PCU?
NO
YES
Replace pressure transducer and verify atmospheric reading.
Fault code is not active. Re-verify flow chart steps and wait for fault to reoccur
See fault code "No Code" (page 53) for audible air leak in PCU.
Is the reading within range?
YES
NO
Done.
Replace ECU and recheck system.
Refer to Service Manual

Troubleshooting

Code: 9P!

Type: Trend Fault

System Mode	Condition	Possible Causes*
Channel inoperative	Loss of channel pressure in inflate mode	• Damaged or leaking tire • Leaking lines • Leaking seals • Leaking wheel valve • Faulty Pneumatic Control Unit • Faulty Electronic Control Unit

*Possible causes are listed in order of likely occurrence.

Code Description

Code 9P! displays when system pressure is dropping while in inflate mode. The air leak that is causing 9P! is large enough to more than offset the pressure input, and should be clearly audible.

The air leak can be located either before or after the wheel valve location. The components located before the wheel valve that may cause a code 9P! include:

- Leaking control lines
- Restricted wheel valve exhaust port
- Leaking wheel air seals

Components located after the wheel valve that may cause a code 9P! include:

- Tire damage
- Rim leaks
- Leaking air lines
- Faulty wheel valve.

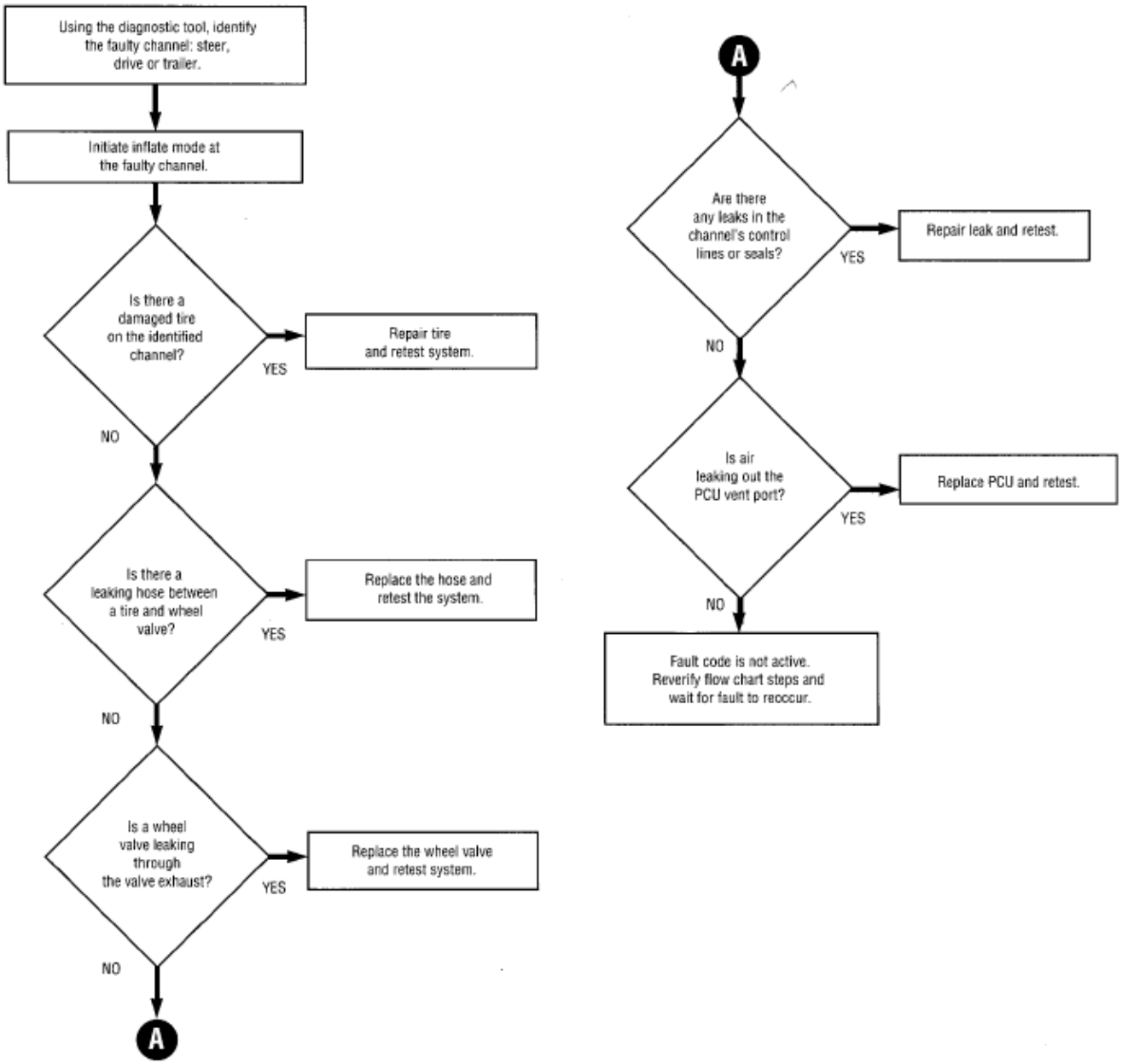
To correctly diagnose the faulty component, connect the Diagnostic Tool (see Section 5 for test equipment and descriptions) and follow the procedure in the 9P! troubleshooting tree.

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Troubleshooting Tree

Code: **9P!**

Type: **Trend Fault**


Using the diagnostic tool, identify the faulty channel: steer, drive or trailer.
Initiate inflate mode at the faulty channel.
Is there a damaged tire on the identified channel?
YES
Repair tire and retest system.
NO
Is there a leaking hose between a tire and wheel valve?
YES
Replace the hose and retest the system.
NO
Is a wheel valve leaking through the valve exhaust?
YES
Replace the wheel valve and retest system.
NO
A
A
Are there any leaks in the channel's control lines or seals?
YES
Repair leak and retest.
NO
Is air leaking out the PCU vent port?
YES
Replace PCU and retest.
NO
Fault code is not active. Reverify flow chart steps and wait for fault to reoccur.

Troubleshooting

Code: 10P!

Type: Tire Leak (Confirm)

System Mode	Condition	Possible Causes*
Channel inoperative	Channel confirmation failure	• Damaged or leaking tire • Leaking line between wheel valve and tire • Wheel valve shut off failure

*Possible causes are listed in order of likely occurrence.

Air Pressure Check

Note that the Tire Pressure Control System is not continuously pressurized; pressure checks occur on a periodic basis. During tire pressure checks, the system delivers compressed air to each channel for approximately two seconds while monitoring the pressure in that channel.

Code Description

Code 1OP! displays if a channel fails to confirm tire pressure. Following an inflate or deflate of a given channel, the Tire Pressure Control System will return to that channel to confirm, or "double-check" the new pressure. If the pressure has dropped, the system will reinflate, and then reconfirm that channel. After multiple confirmation attempts, the system will log a 1OP! and the channel will become inoperative.

A confirmation failure can be caused by:

- Damaged or leaking tire
- Leaking air line between the wheel valve and tire
- Wheel valve failure.

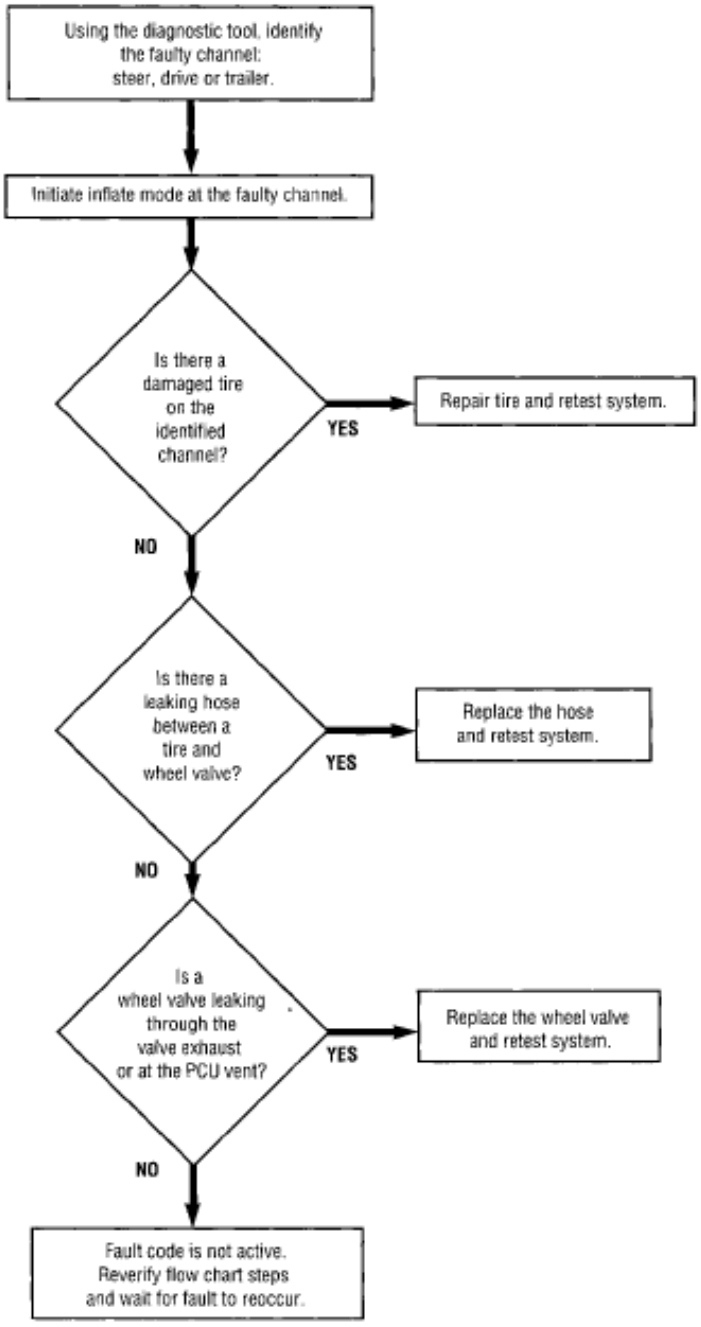
To correctly diagnose the faulty component, connect the Diagnostic Tool (see Section 5 for test equipment and descriptions) and follow the procedure in the 10P! troubleshooting tree.

See "Troubleshooting Tips" on page 20 for general guidelines on system diagnostics.

Troubleshooting Tree

Code: **10P!**

Type: **Tire Leak (Confirm)**


Using the diagnostic tool, identify the faulty channel: steer, drive or trailer.
Initiate inflate mode at the faulty channel.
Is there a damaged tire on the identified channel?
YES
Repair tire and retest system.
NO
Is there a leaking hose between a tire and wheel valve?
YES
Replace the hose and retest system.
NO
Is a wheel valve leaking through the valve exhaust or at the PCU vent?
YES
Replace the wheel valve and retest system.
NO
Fault code is not active. Reverify flow chart steps and wait for fault to reoccur.

Code: 11P!

Type: Tire Leak (Imbalance)

System Mode	Condition	Possible Causes*
Channel inoperative	Tire pressure lower on one tire than others on same channel	• Severe tire damage or leaks • Leaking lines • Leaking seals • Leaking wheel valve • Crimped or restricted control lines

*Possible causes listed in order of likely occurrence.

Air Pressure Check

Note that the Tire Pressure Control System is not continuously pressurized; pressure checks occur on a periodic basis. During tire pressure checks, the system delivers compressed air to each channel for approximately two seconds while monitoring the pressure in that channel.

Code Description

Code 11P! indicates that either the tire pressure on one tire was read lower than the other tires on that channel, or there is an air leak someplace in the system.

Low tire pressure can be caused by a damaged tire, plugged wheel valve filter or leaking air lines. An air leak can be located either before or after the wheel valve.

The components located before the wheel valve that may cause a code 11P! include:

- Leaking control lines
- Restricted wheel valve exhaust port
- Leaking wheel air seals

Components located after the wheel valve that may cause a code 11P! include:

- Damaged tire
- Rim leaks
- Leaking air lines
- Wheel valve damage.

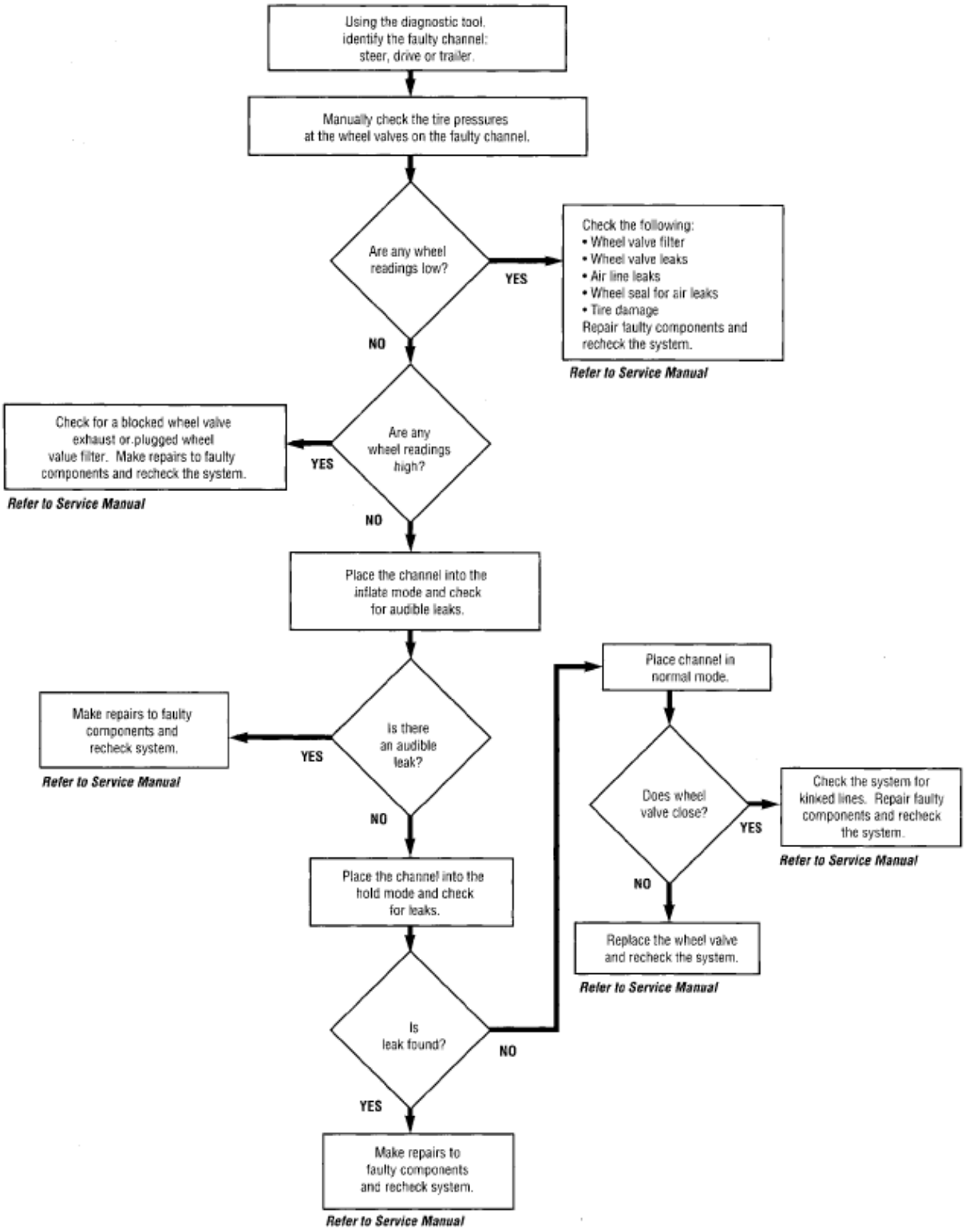
To correctly diagnose the faulty component, connect the Diagnostic Tool (see Section 5 for test equipment and descriptions) and follow the procedure in the 11P! troubleshooting tree.

See “Troubleshooting Tips” on page 20 for general guidelines on system diagnostics.

Troubleshooting Tree

Code: 11P!

Type: Tire Leak (Imbalance)


Using the diagnostic tool, identify the faulty channel: steer, drive or trailer.
Manually check the tire pressures at the wheel valves on the faulty channel.
Are any wheel readings low?
YES
Check the following:
• Wheel valve filter
• Wheel valve leaks
• Air line leaks
• Wheel seal for air leaks
• Tire damage
Repair faulty components and recheck the system.
Refer to Service Manual
NO
Are any wheel readings high?
YES
Check for a blocked wheel valve exhaust or plugged wheel value filter. Make repairs to faulty components and recheck the system.
Refer to Service Manual
NO
Place the channel into the inflate mode and check for audible leaks.
Is there an audible leak?
YES
Make repairs to faulty components and recheck system.
Refer to Service Manual
NO
Place the channel into the hold mode and check for leaks.
Is leak found?
NO
Place channel in normal mode.
Does wheel valve close?
YES
Check the system for kinked lines. Repair faulty components and recheck the system.
Refer to Service Manual
NO
Replace the wheel valve and recheck the system.
Refer to Service Manual
YES
Make repairs to faulty components and recheck system.
Refer to Service Manual

Code: No Code

Type: Miscellaneous

Although the Tire Pressure Control System is self-diagnosing, there are some operating problems that do not trigger a fault code. The following chart lists these conditions along with possible causes and solutions:

Condition *Operating problems that do not trigger a fault code.*	Possible Causes* *Since a fault code was not set, these conditions may be universal and not call for a troubleshooting routine.*	Solution *Where fault codes appear, refer to the troubleshooting procedures listed under that code.*
Operator Control Panel		
Intermittent Operator Control Panel operation or occasional Logo Only	• Intermittent ground or power connection to Operator Control Panel or Electronic Control Unit	4C!
No display or operation	• Fuses	Check fuses
Blank Operator Control Panel display	• Operator Control Panel fuse blown • Bad ground to Operator Control Panel • Bad switched ignition line to Operator Control Panel • Faulty Operator Control Panel	4C!
Operator Control Panel display is alway dim and no backlighting on Operator Control Panel buttons.	Lamp 2 wire is disconnected. It should be grounded for "bright" and tied to +12V for "dim" and backlight.	See wiring schematic (page 55) or installation guide.
System loses programmed tire pressure settings.	• Improperly followed programming procedure • Faulty Electrical Control Unit	• Reference programming procedure • Replace Electronic Control Panel
Tire Pressure		
Display shows tires at higher pressure than target, yet system does not attempt to deflate	Tire pressure rises due to temperature, are not bled off by the Tire Pressure Control System. This is normal operation.	System will only initiate a deflate if a mode with a lower target pressure than current target is selected.
No display of pressures and no apparent inflate or deflate	• Pressure switch not closed	7P!
Pressure Imbalance (tires on same channel at different pressures)	• Defective hose • Clogged filters	11P!
No display of pressures on Operator Control Panel	• OCP is in "Quiet Mode"	Refer to "Select Key" in section 3 Operator Instructions
No inflate or deflate of particular tire	• Valve stem core not removed on tire	Remove hose from tire valve stem and remove core. Replace hose.
Innacurate tire pressures	• Leaking control lines • Faulty pressure transducer • Faulty Electrical Control Unit	8P! and 11P!

*Possible causes are listed in order of likely occurrence.

Code: No Code

Type: Miscellaneous

Condition *Operating problems that do not trigger a fault code.*	Possible Causes* *Since a fault code was not set, these conditions may be universal and not call for a troubleshooting routine.*	Solution *Where fault codes appear, refer to the troubleshooting procedures listed under that code.*
Air Leaks		
Air bleeding from drive axle vents	• Air seal degradation	Refer to Service Manual.
Tires fail to deflate when lower pressures are requested	• Pneumatic system problem	3P!
Leaking tires	• Damaged tire • Loose connection between wheel valve and tire • Faulty wheel valve	Refer to Service Manual
Air bleeding (audible) through Pneumatic Control Unit when ignition is turned off.	Wheel valve is leaking back through control lines	Identify tire with low pressure and replace faulty wheel valve.
Other		
Apparent continuous operation, or slow inflates or deflates	• Between mode • Trend fault	4P!, 9P!, 10P!
System stopped in middle of inflate or deflate (display shows steady arrow before reaching targeted pressures)	• Intermittent transducer short or open	5C!
Wheel end oil leak	Faulty air or oil seal	Refer to Service Manual
Trailer present, not detected	• Disconnected trailer air line connector • Clogged trailer air lines • Crimped control line on trailer channel	Refer to Service Manual
Trailer detected, not present	• Trailer connector on tracter side doesn't seal when disconnected • Leaking line between Pneumatic Control Unit and trailer air line connector	Refer to Service Manual

*Possible causes are listed in order of likely occurrence.

Appendix A

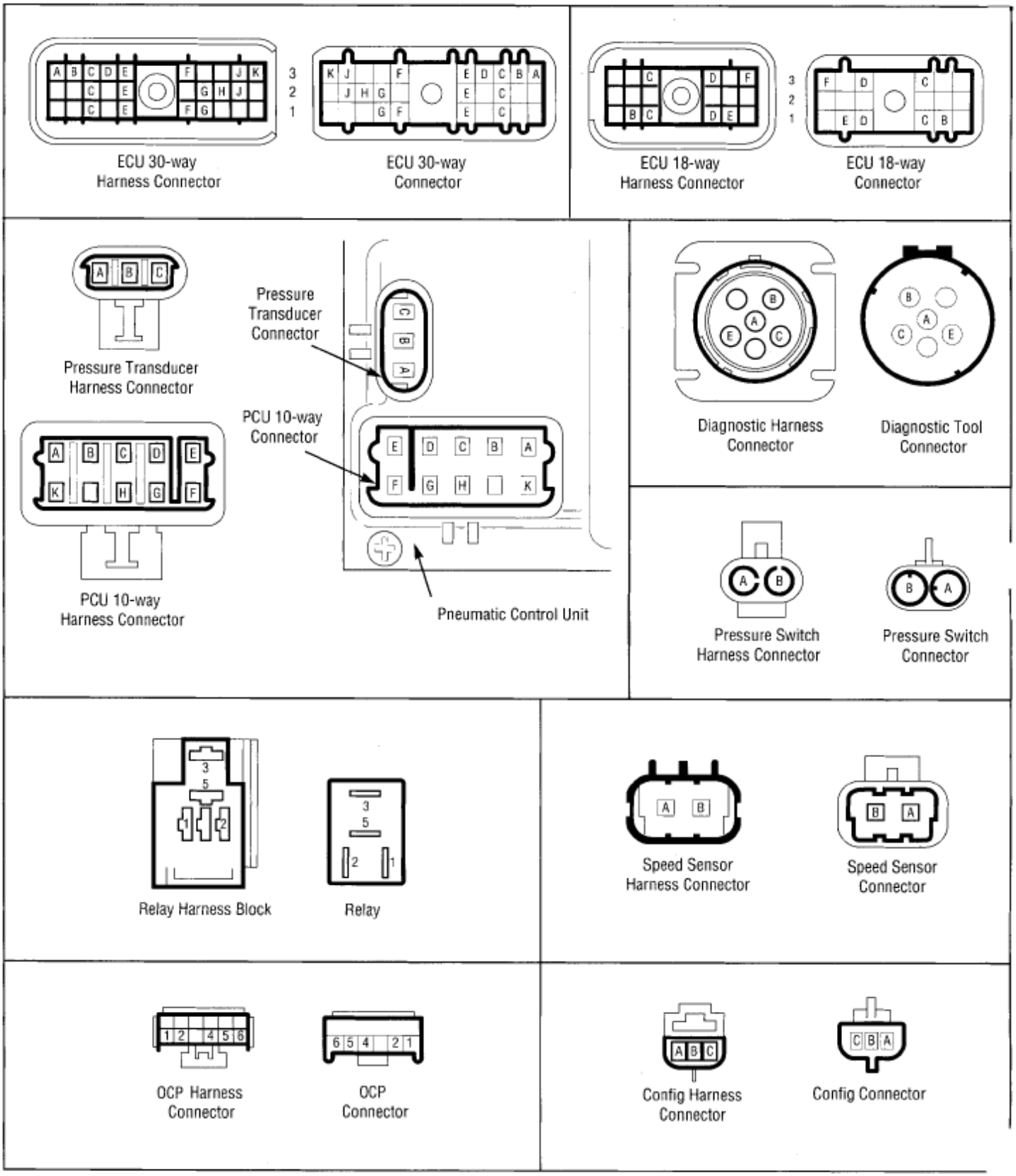


Figure 6 Connector Illustrations

Appendix A

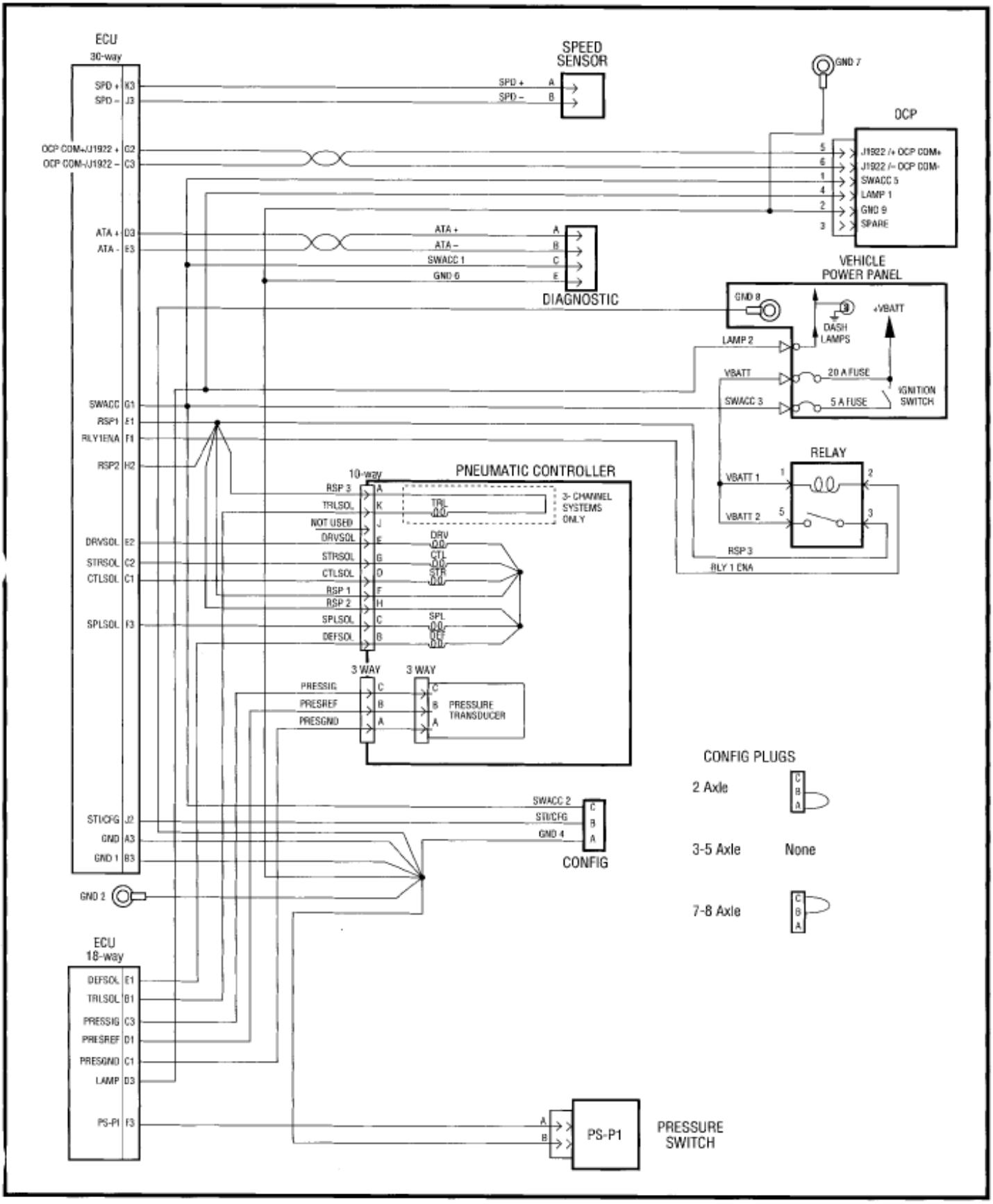


Figure 7 Electrical Schematic

SPICER®
Drivetrain Products

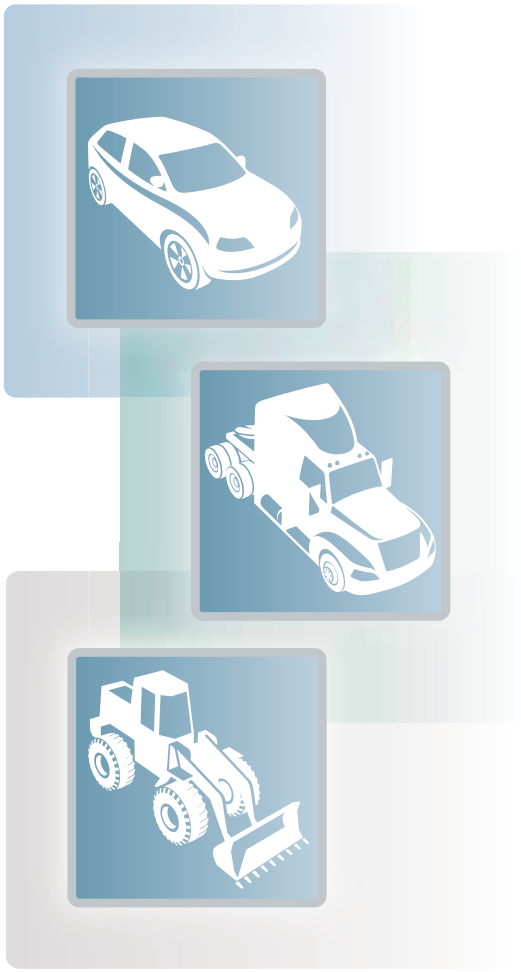
Axles
Driveshafts
Off-Highway Transmissions

LONG®
Thermal Products

Transmission Oil Coolers
Engine Oil Coolers

VICTOR REINZ®
Sealing Products

Gaskets and Seals
Cylinder-Head Cover Modules
Thermal-Acoustic Protective Shielding



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